Dual

Dual TG 29 Service Manual

Edition August 1971

High fidelity Stereo tape deck Dual TG 29

Technical data
Service tips
Schematic diagram
Printed wiring boards
Parts list

Dual Gebrüder Steidinger · 7742 St. Georgen/Schwarzwald

dualcan

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Technical data

The unit surpasses the requirements of DIN (German Industry Standard) 45 500 on high fidelity standards and is measured with blank tape C 264 - Z.

Line voltages

110, 130, 220, 250 V, 50 Hz,
adjustable to 117 V , 60 Hz

Power consumption

approx. 28 watts

Fuses

2 x G-fuses F 400 mA

Track placement

4-track international

Tape heads

1 double-gap ferrite erase head
1 record head with hyperbolic contur finish, toroidal core system
1 playback head with hyperbolic contour finish, toroidal core system

Tape speeds

19.05 cm/sec (7 1/2 i.p.s.) ± 1 %
9.53 cm/sec (3 3/4 i.p.s.) ± 1 %

Wow and flutter

DIN 45 507 weighted
at 7 1/2 i.p.s. ≦ ±0.10 %
at 3 3/4 i.p.s. ≦ ±0.15 %

Frequency response DIN 45 511

at 7 1/2 i.p.s.	30 – 20 000 Hz
at 3 3/4 i.p.s.	30 – 14 000 Hz

Equalization DIN 45 513

at 7 1/2 i.p.s.	3180/50 µs
at 3 3/4 i.p.s.	3180/90 µs

Distortion DIN 45 511

$K_3 \leqq 3$ % measured at 333 Hz, recording level modulated to 0 dB

Signal/noise ratio

DIN 45 405, DIN 45 511
at 7 1/2 i.p.s. ≧ 52 dB
at 3 3/4 i.p.s. ≧ 50 dB
CCITT
at 7 1/2 i.p.s. ≧ 56 dB
at 3 3/4 i.p.s. ≧ 54 dB

Stray noise ratio

DIN 45 405, DIN 45 511	≧ 46 dB
CCITT	≧ 51 dB

Cross talk damping

measured at 1 kHz

stereo	≧ 50 dB
mono	≧ 58 dB

Erasure damping

DIN 45 510 measured at 1 kHz ≧ 65 dB

Oscillator frequency:

95 kHz

Inputs DIN 45 511

2 x microphone	0.15 mV	at Ri = 3.5 kOhm
radio	0.15 mV	at Ri = 3.5 kOhm
phono	45 mV	at Ri = 1 MOhm

Outputs

(Output voltage at full level) DIN 45 511

radio	0.775 V	at Ri = 18 kOhm
phones	0.775 V	at Ri = 1.2 kOhm
monitor	0.775 V	at Ri = 18 kOhm

Complement

19 silicon transistors
9 diodes

Pilot light

24 - 30 V / 30 mA, glass base W 2 d

Size of reels

up to 7" diameter

Playing time for 7" reel

at 3 3/4 i.p.s.; triple play tape, maximum 3 hours in one direction

Rewind time

3 1/2 minutes for 7" reel with 540 m tape

Dimensions

TG 29 CV	383 x 298.2 x 134.5 mm
CTG 29	420 x 363 x 145 mm

Weight

TG 29 CV	6.6 kg
CTG 29	7.8 kg

Mechanical part

1. Dismounting and mounting

The dress plate need not be removed for dismounting and mounting the unit. The unit is mounted on the mounting board by means of four screws; these four screws are located underneath the four plastic covers on the dress plate. Use a knife blade to lift off the plastic covers.

The dress plate can be removed after removing the knobs and after the six Phillips screws on the dress plate and next to the keys have been removed.

2. Brakes

The brakes work on the principle of rope looping and are controlled via the feeler lever directly by the tape. This results in a constant tape pull. The force of the tape pull depends on the adjustment of the brakes. This pull is in order when the embossed line (M) on the brake levers is positioned under the marking notches of the head mounting plate. Adjust by turning the adjustment bolts.

To measure the tape pull, place an almost empty reel on the appropriate rewind spindle (6/149), fasten the tape leader to a spring balance scale and pull the tape slowly, at approximately tape speed, straight a head through the open tape slot. The tape pull has to be 28 – 35 grams. If the tape pull is too slight, it will lead to poor tapehead contact and thus to drop-outs in playback. If the tape pull is too strong, the tape movement will be faulty during rapid forward and rewind.

After a new brake cord has been fitted (13/156), the brake plate in the brake lever (33/134) must be secured again by means of a varnish primer. Prior to final adjustment, the brake rope must be stretched forcefully once so that the rope cannot give way at its anchoring points.

3. Motor

When the motor (231) is changed, care must be taken to see that the connection cables do not impair the swinging motion of the motor during fast forward and rewind. In order to avoid this, the cable loops should be as large as possible and unrestricted in their movement. The drive pulley (323) must be screwed on in such a manner that the belt (103) passes freely between shift fork (18) and guide rot (17) and that the speed selection functions properly.

4. Adaptation to a different line frequency

Adaptation to another line frequency is done by changing the motor pulleys.

a) After slackening the fixing screws at the side pull off the knobs, remove the six screws, then lift off the unit cover and take off the drive belt.

b) Screw out the countersunk screw, exchange the small and large motor pulley and tighten up the countersunk screw again.

c) Put on the belt and secure the unit cover again by screwing in the six screws. Put the knobs back on and lock them on the spindle by tightening up the fixing screws.

Motor pulley pair for 50 Hz = Order No. 214 595
Motor pulley pair for 60 Hz = Order No. 214 596

5. Drive pulley assembly

When putting the drive pulley assembly together, it is essential that the sequence for the individual parts be adhered to as shown in Fig. 2. The contact surface between the friction wheel (311) and the spring (312) should be greased. Screw the individual parts together with the countersunk screw (306).

Fig. 1

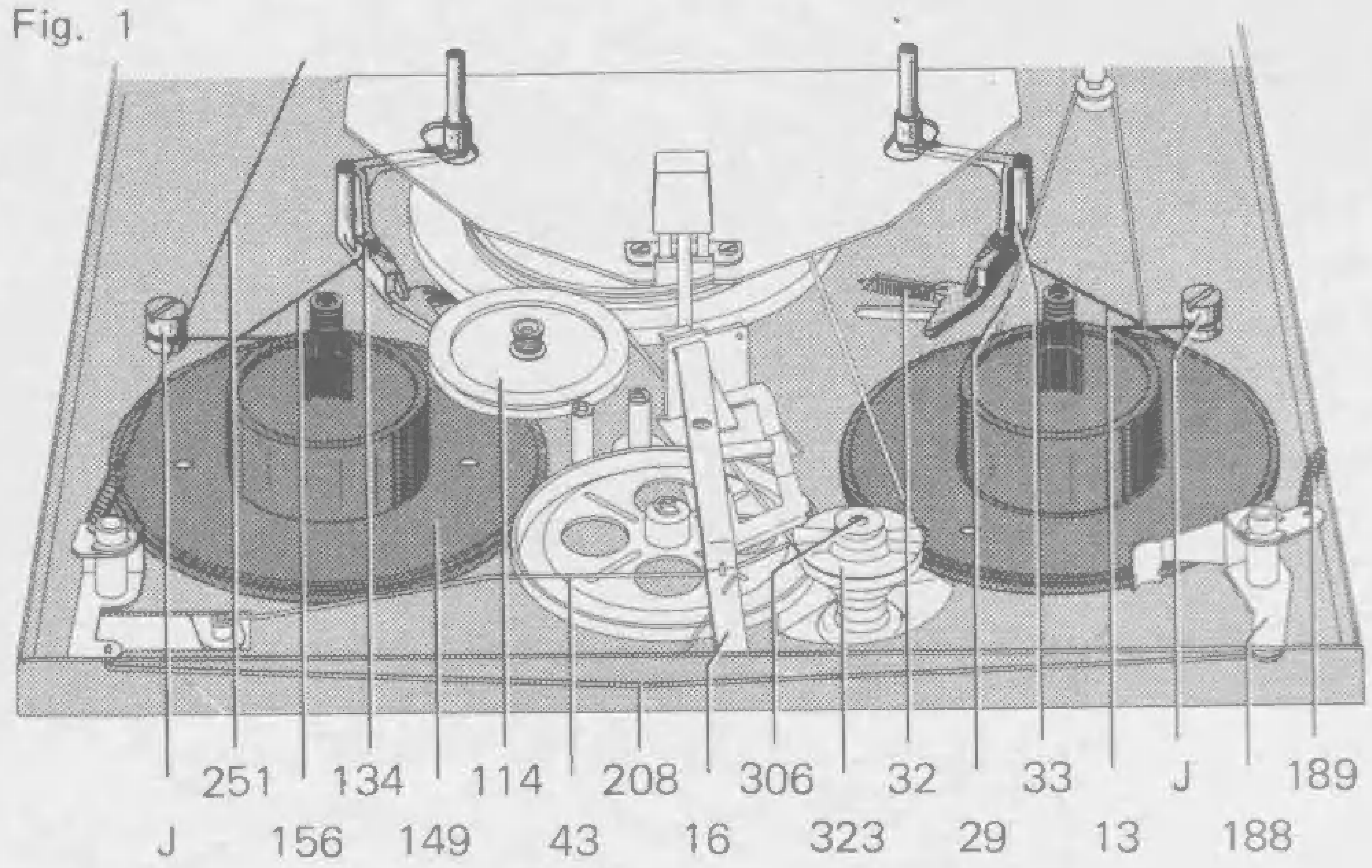


Fig. 2

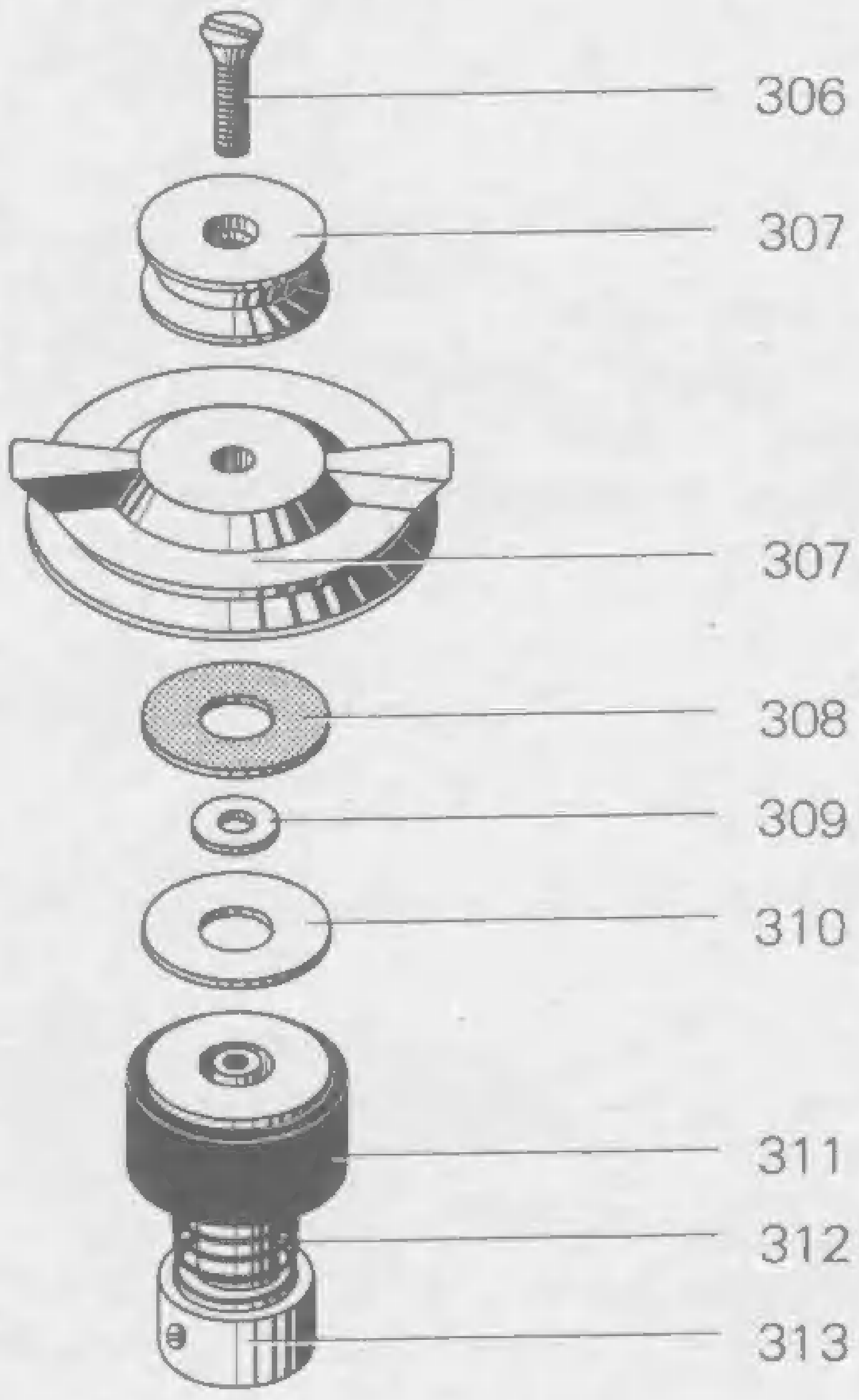


Fig. 3

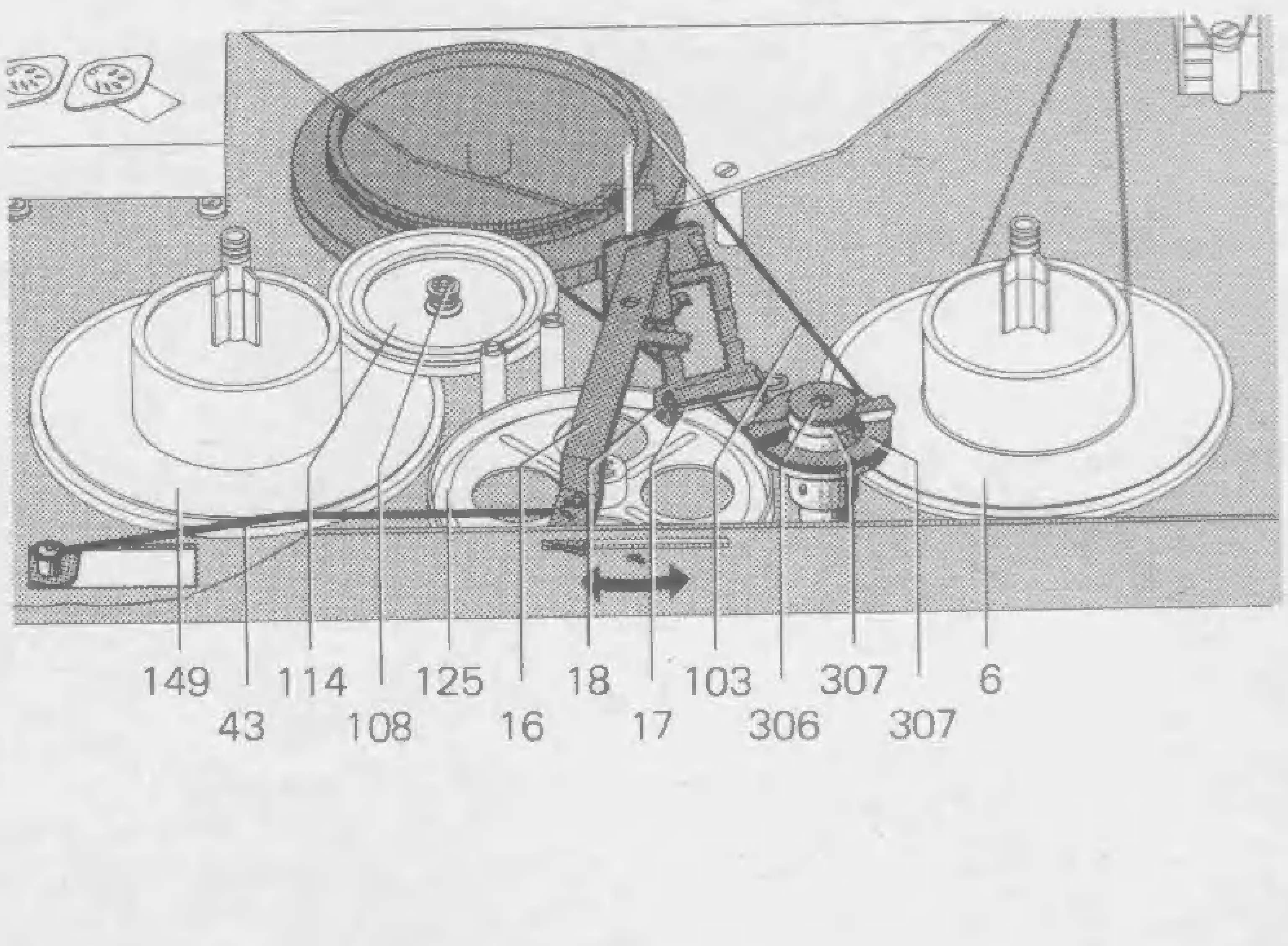


Fig. 4

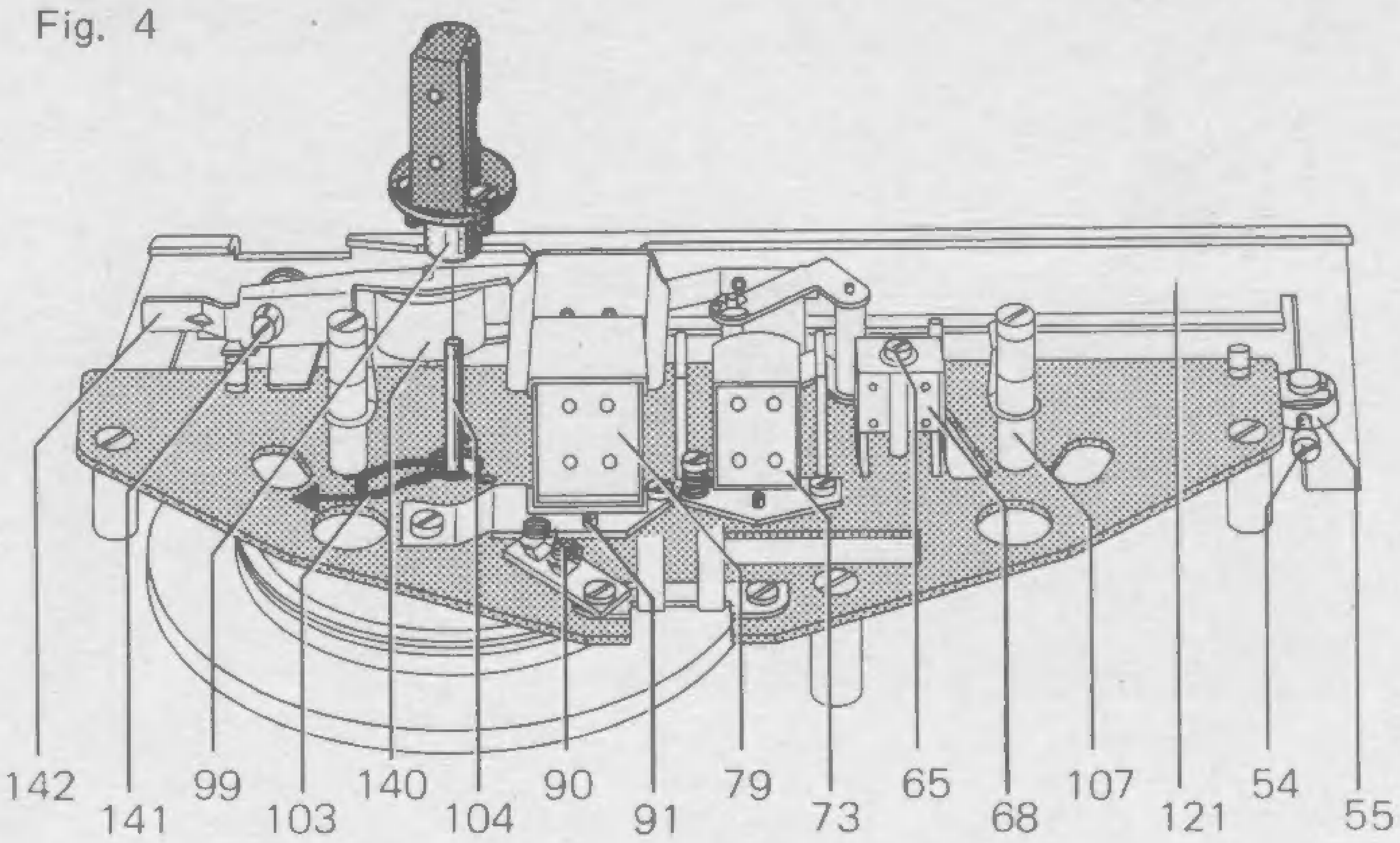


Fig. 5

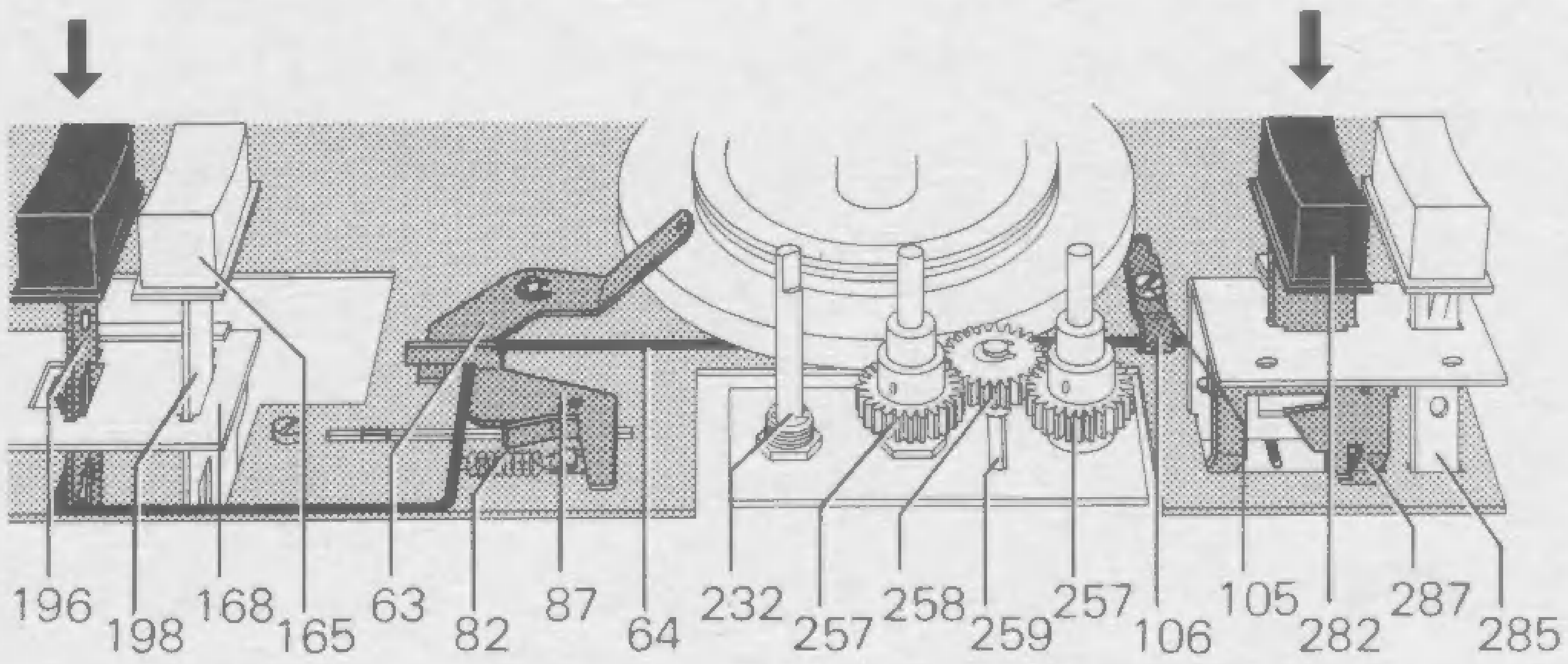


Fig. 6

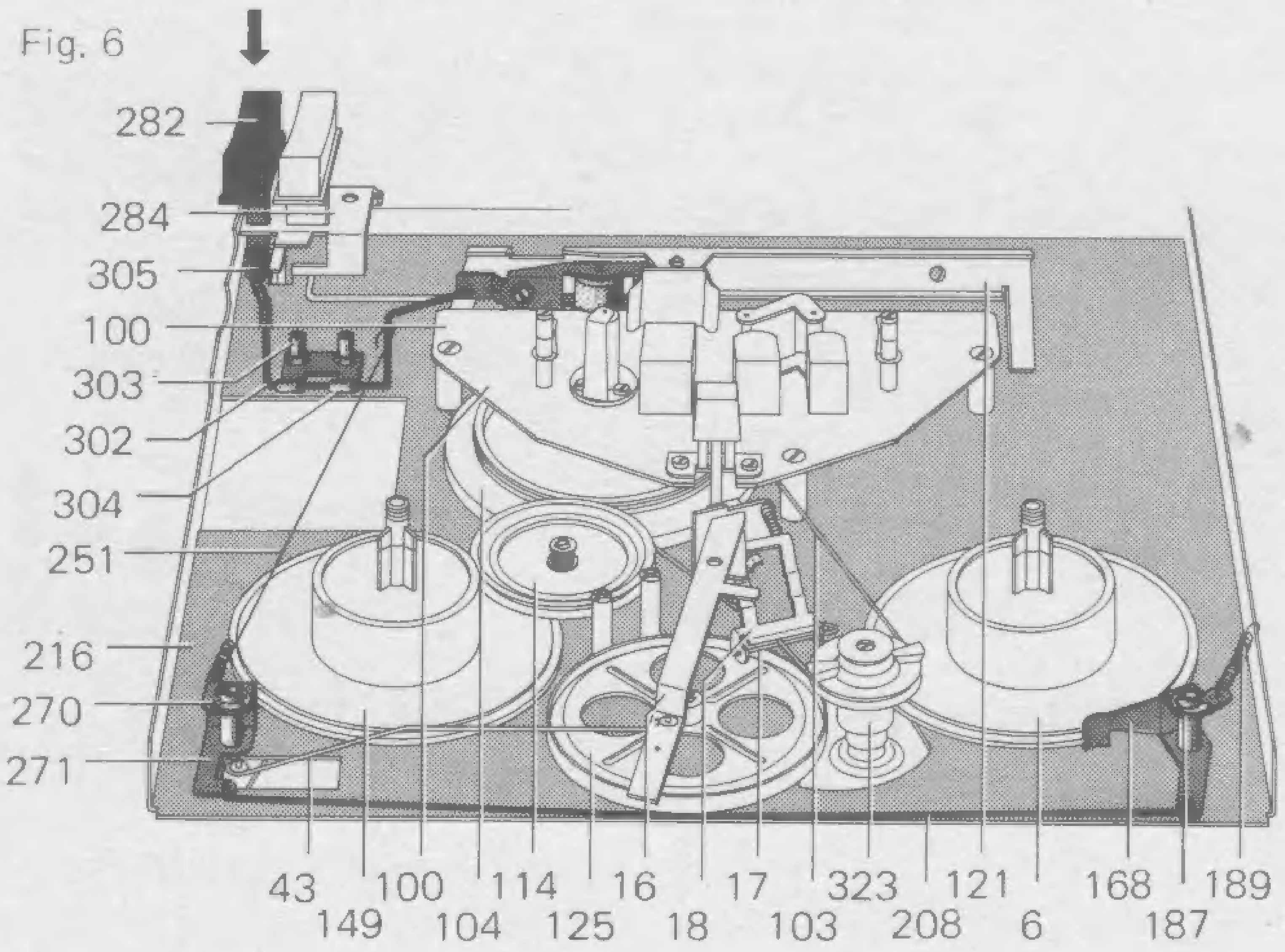
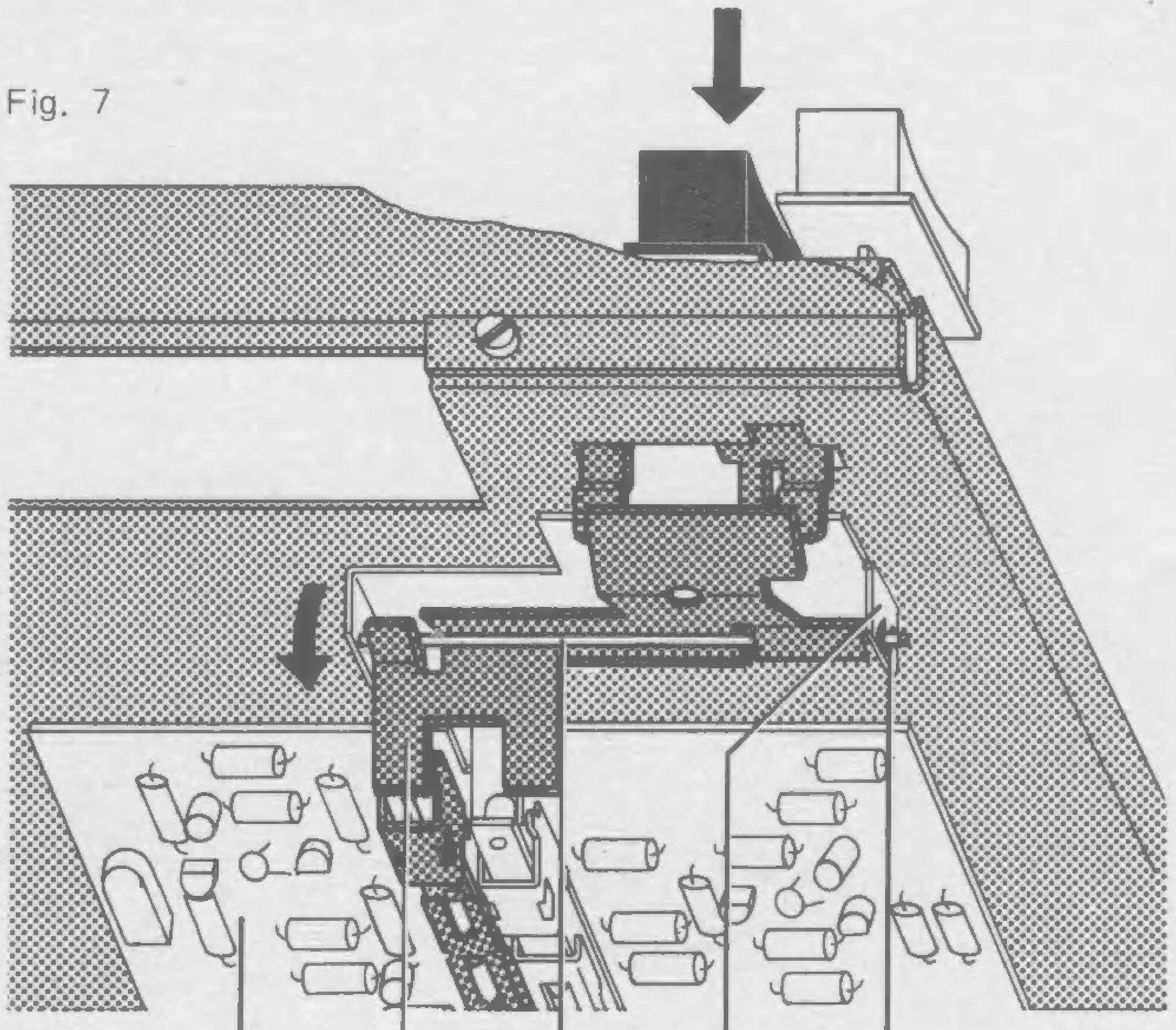


Fig. 7



6. **Speed selection**

To change the speed, move the drive belt (103) through the shift fork (18) (while the belt is running) from one motor pulley to the other. The drive belt (103) must pass freely between the shift fork (18) and the guide rod (17) at both tape speeds. An adjustment can be made by bending the metal tabs on the shift fork (18) or shift lever (16) respectively and by shifting the drive pulley (328) axially. To shift the drive pulley, slacken the set screw (313) which is located at the side. (Fig. 3).

7. **Drive belt**

To change defective belts, pull the guide rod (17) out of the shift fork (18). Push the shift lever (16) backward. Slacken the three mounting screws of the capstan bearing (99) and pull off the latter upwards. The belt can now be pulled out from between the capstan (104) and the head mounting plate with a wire hook. A new belt is fitted in the reverse order.

Caution: Under no circumstances must the drive belt become oily or greasy since this would ruin it.

8. **Recording interlock**

The recording interlock blocks the recording key (282), which can be depressed only when the stop key is depressed at the same time. The recording interlock is properly adjusted if the front side of the control wire (64) is flush with the face of the recording plunger (287). For proper adjustment, move the adjustment clamp (106). (Fig. 5).

9. **Fast stop**

The fast stop key "Pause" is for interrupting play. The fast stop is properly adjusted when the stop rod (302) is 0.5 – 1 mm (.02" – .04") from the pressure bracket (142) during play. With the fast stop key depressed, the stop rod should engage at about the center of the pressure bracket. Proper adjustment is done by bending the stop rod.

The brake angle should, if not operating, be approximately 0.5 – 1 mm (.02" – .04") from the rubber ring of the rewind spindle (6). To adjust, bend the brake angle (188).

10. **Recording / replay key S 1**

When the recording key is depressed, the metal tab of the switch angle (295) must be so adjusted that the contact spring and contact blades of the recording / replay key are flush with each other. To adjust, bend the metal tab (290). (Fig. 7).

11. **Start key S 2**

When the start key is depressed, the metal tab of the pressure lever (121) must be so adjusted that the contact spring and contact blades of the start key are flush with each other. To adjust, bend the metal tab. (Fig. 8).

12. **Fast forward and rewind**

During rewinding, operation becomes critical when a 7" take-up reel is almost full.

Care must be taken to see that the tape guide posts of the unit as well as the rubber friction wheels are clean. Cleaning is done in accordance with Para. 17. The brakes must be set to the right tape pull.

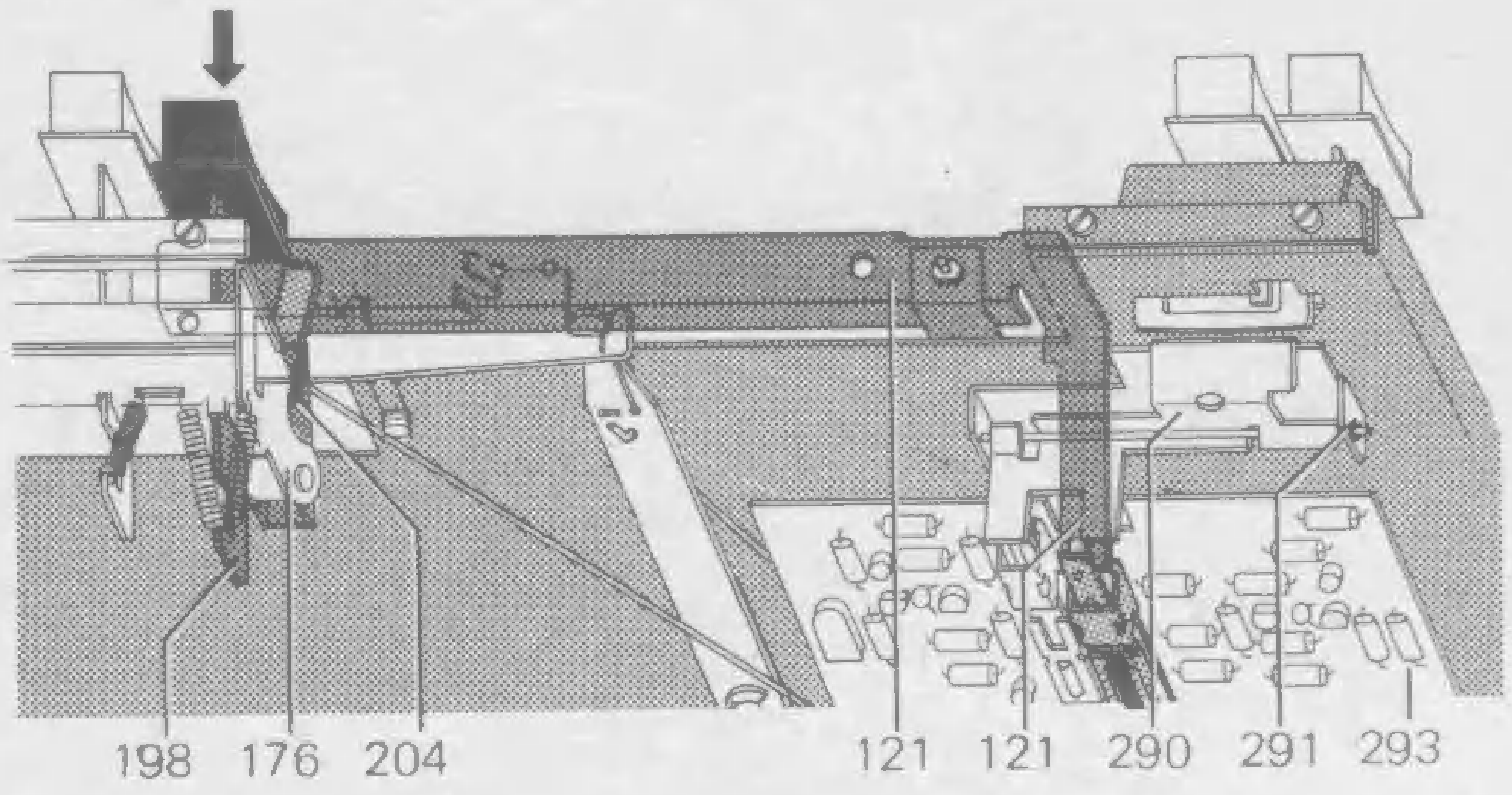
The cable loops on the motor must be as large as possible and unrestricted in their movement to prevent impairing the swinging movement of the motor.

13. **Take-up reel**

The take-up reel winds up the tape coming from the capstan via a sliding coupling (slip clutch). The take-up reel and slip clutch must operate without any jerks or jolts in order to eliminate wow and flutter. The engagement of the take-up reel (114) can be adjusted by bending the hang-in tab (L) for the control wire (220). In the "Stop" position, the drive bushing (116) must be visibly disengaged from the tape spindle. (Fig. 9).

When the c-ring (108) is placed on the shaft of the take-up reel (114), care must be taken that it is clamped firmly on the shaft (222) of the lever and that it does not rotate during play. If this is not the case, bend the c-ring slightly together prior to mounting it. The running surface between the c-ring (108) and the plastic cover (110) must be greased.

Fig. 8

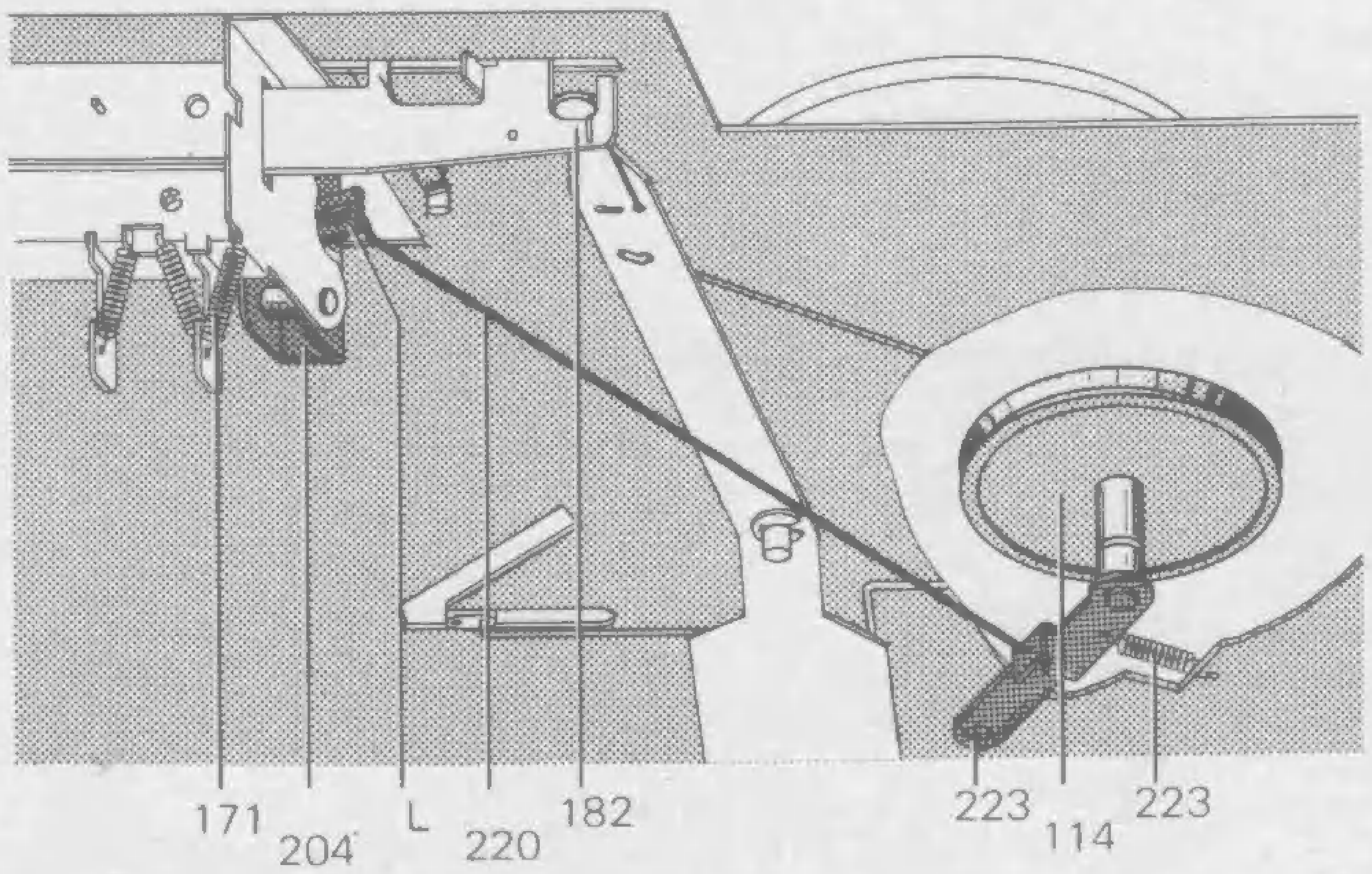


14. **Position of the pressure lever and pressure bracket**
During operation the pressure lever (121) must lightly touch the left black bolt (B 1) on the head mounting plate (100). At the right bolt (B 2), a distance of approx. 0.5 mm (.02") is sufficient. Adjustment is made by aligning the pressure lever (121) and the bronze spring of rocker lever (204).

The centering screw (141) of the pressure angle (142) must leave sufficient free play (tolerance) for the pressure angle (142).

15. **Tape shut-off**
The tape shut-off is adjusted with screw (54). After this screw (54) has been turned, it is essential that it be properly secured again (e.g. by means of screw-securing varnish). The adjustment is correct when the shut-off mechanism engages at approximately 4 mm from the end of the feeler pin path.

Fig. 9



16. **Cementing tip**
If cemented joints have become loose, methylene chloride or trichlor ethylene (trilene) should be used to cement the keys on the plastic clamping pieces. Use contact glue (e.g. UHU) to cement the tape counter window, the plastic parts on the sides, the volume control instruments and the escutcheons.

17. **Cleaning**
The parts should be cleaned after any repairs. The recoding head (73), the replay head (79), the erase head (68), the tape guides (50/107) and the capstan (104) – as well as all the rubber running surfaces – must always be kept spotlessly clean.

A linen rag soaked in cleaning petrol should be used to clean these parts. It can be wrapped around a little wooden stick for cleaning the heads. A little cotton-wool stick has also proved effective here. Never use a screwdriver.

18. **Lubricating**
All the bearings and sliding surfaces of the unit are adequately lubricated at the factory. Under normal working conditions, it is not necessary to relubricate them for years, since the most important bearing points are equipped with sintered bearings.

Bearing points and sliding surfaces should simply be lightly lubricated. It is very important that no oil or grease get on the rubber running surfaces and rubber belts, since they would be destroyed. For the same reason these parts should not be touched unnecessarily with one's hands.

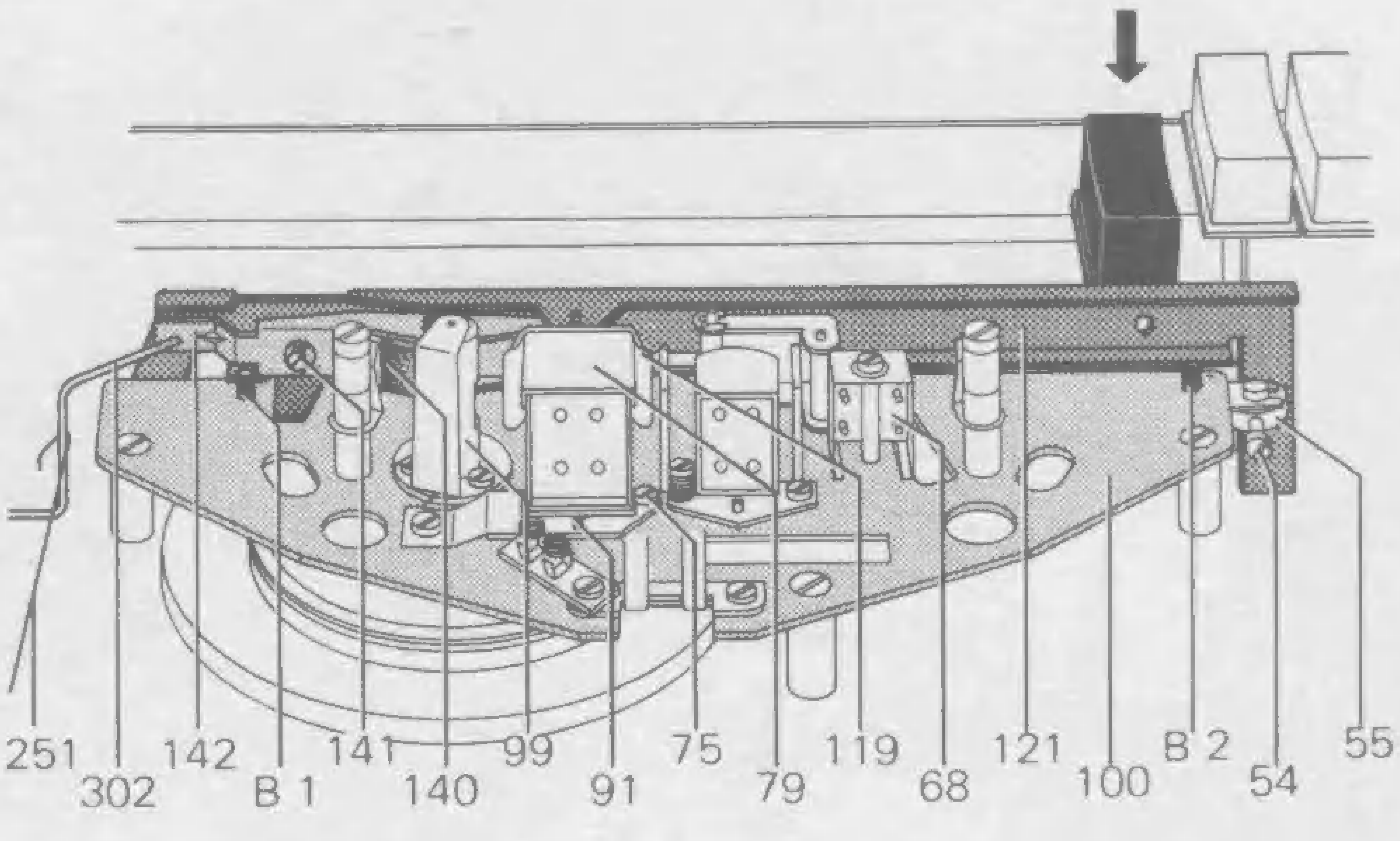
Recommended lubrications

For all bearing points:
BP-Oil Visco-Static

For all friction and sliding surfaces:
Shell Grease A.

Mixing various lubricants often results in chemical decomposition. We therefore recommend that correct lubricants be used.

Fig. 10



Electrical section

1. **Test conditions**

All adjustments should be made at the same line voltage and frequency at which the unit is to be operated.

2. **Test instruments**

Transistor- or V.T.V.M. for
low and high-frequency measurements with Ri ≧ 1 megohm and an upper frequency limit >100 kHz,
lowest measuring range 10 mV.

Generator:
up to 20 kHz forlow-frequency measurements, and if necessary
up to 100 kHz for high-frequency measurements.

Distortion meter:
for adjusting the volume indicator at f = 333 Hz.

Oscilloscope:
with a frequency response of up to approx. 1 MHz, for checking low and high-frequency waveform as well as noise voltage.

Multimeter
calibrated for Ri = 20 kΩ/V to measure the line voltage.

3. **Standard tape**

for all recording and playback adjustments.
Dual standard tape 9 H (223 635) for 3-3/4" i.p.s. tape speed, full-track recording:

1. Yellow leader:
polishing tape, with connecting section for track adjustment.

2. Blue leader:
DIN level 333 Hz.

3. Grey leader:
Frequency response section 10 kHz, with magnetization of – 20 dB compared with DIN 333 Hz standard level (tape flux τ = 90 µs)

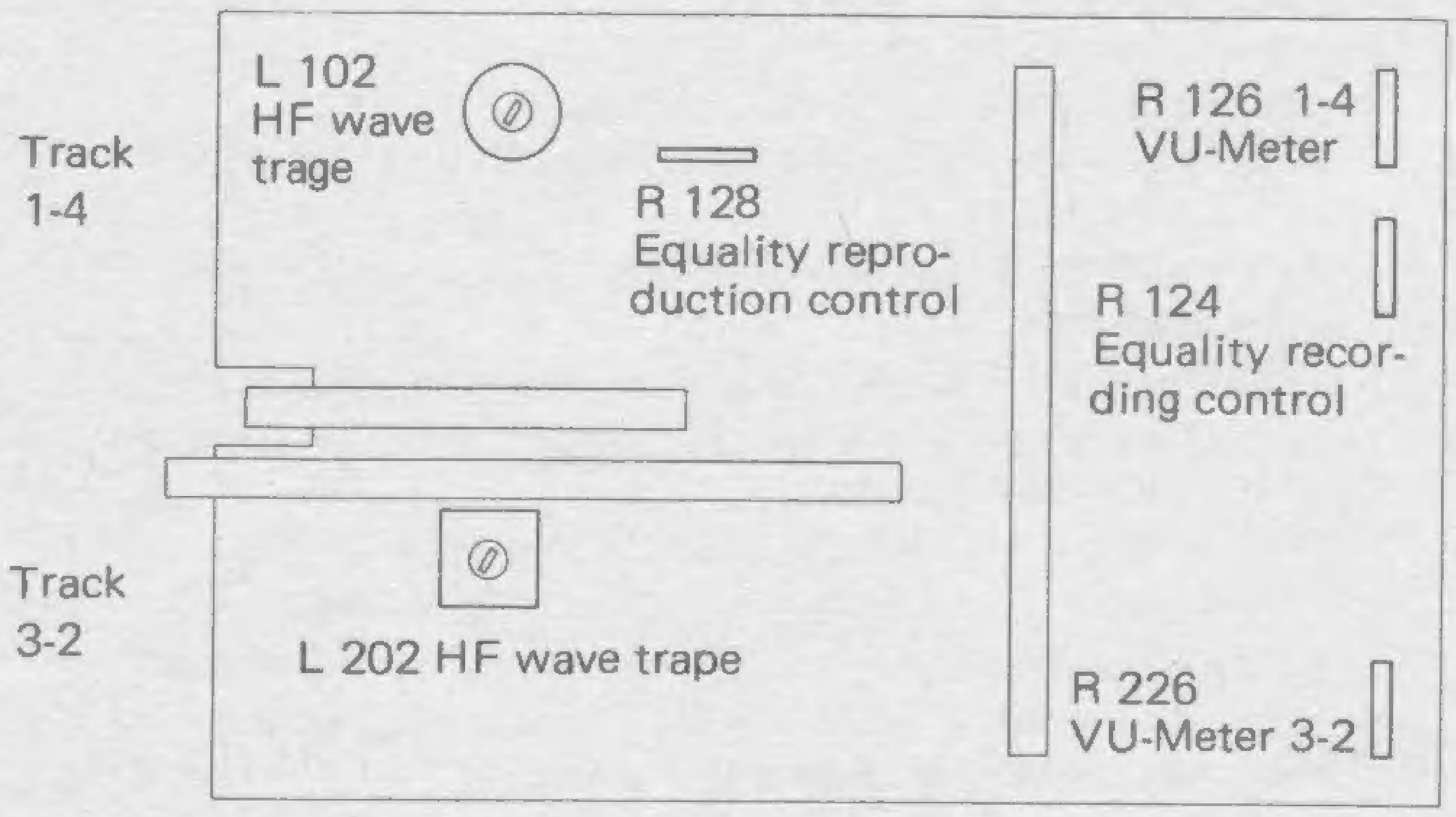
4. Red leader:
DIN blank tape section, C 264 Z

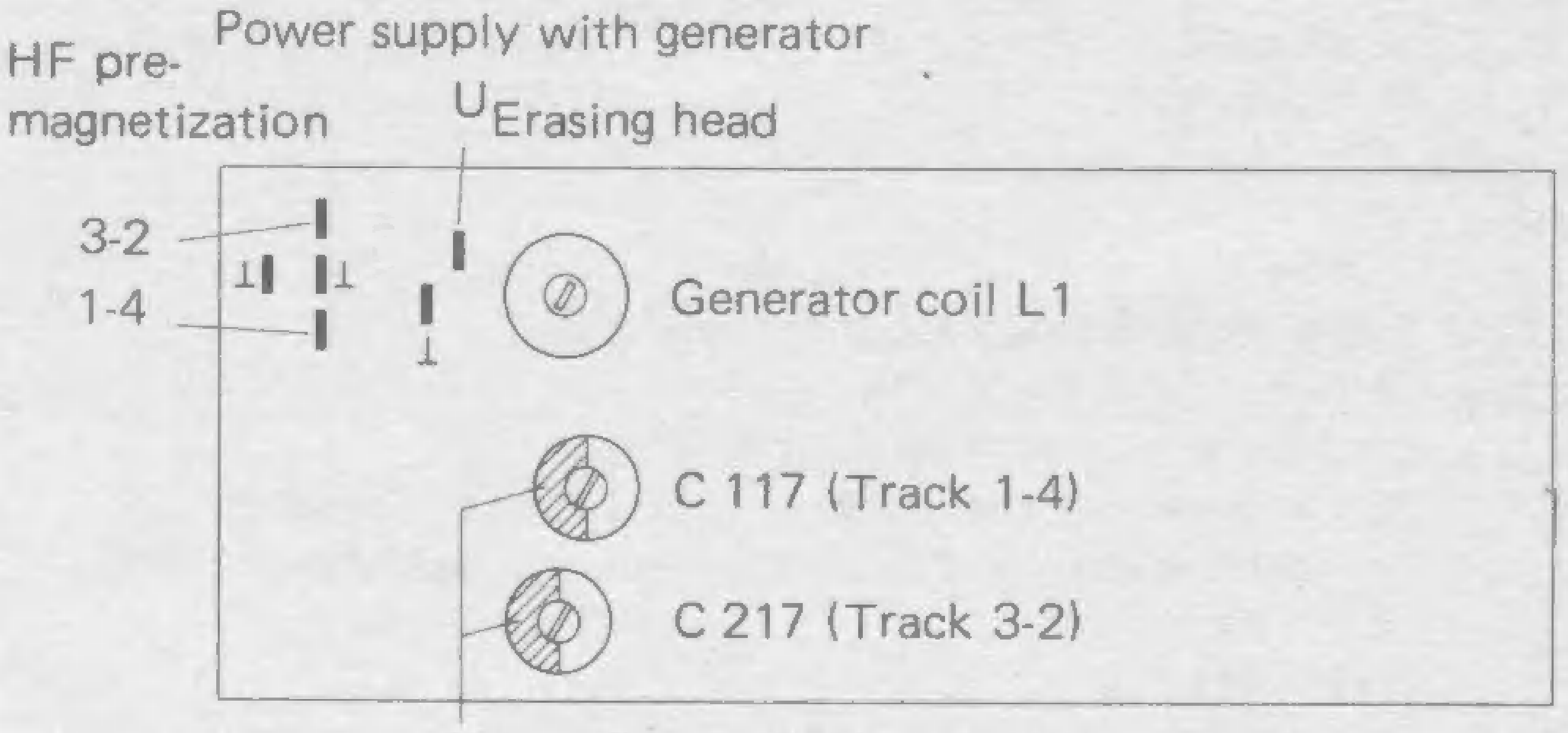
If necessary, h.f. frequency measurements can be made by the frequency comparison method, using a RC generator and the oscilloscope.

Current consumption:
220 V, 50 Hz, approximately 200 mA
110 V, 50 Hz, approximately 400 mA
117 V, 60 Hz, approximately 350 mA

Position of adjustments points

Amplifier board





Cover the one half should be coverad with a silver coating

4. **Playback**

4.01 **Prerequisite for all playback measurements**

The electronic voltmeters are connected to the monitor jack for all playback measurements.

Contact 2 = ground
3 = left channel (tracks 1 – 4)
5 = right channel (tracks 3 – 2)

4.02 **Uniform playback level**

Switch unit to 3–3/4" i.p.s., put operating mode selector to stereo, put on Dual standard tape 9 H with standard level of 333 Hz (blue leader), press start key.

Adjust R 128 in channels 1– 4 to uniform level for both channels.

The permissible difference in level of the two stereo channels when rechecking = 2 dB.

4.03 **Standard level of playback**

Switch unit to 3–3/4" i.p.s., put operating mode selector to stereo, put on Dual standard tape 9 H with standard level of 333 Hz (blue leader), press start key.
The standard playback level must be:
$U_{\text{standard level}} \geqq 330$ mV.

4.04 **Stray noise (hum)**

Put dress plate on,
screen amplifier,
put operating mode selector to stereo,
switch unit to 3–3/4" i.p.s.,
block tape end switch-off,
press start key.

Balance the compensation (humbucking)coils L 101 and L 201 to reduce stray noise to a minimum by shifting their position (next to the soldered side), then glue them firmly in position again with UHU glue.

Stray noise must not fluctuate heavily (poor components in transistor stages T 105 and T 205):
$U_{\text{stray noise}} \leqq 4.5$ mV

4.05 Trimming the playback head

Switch unit to 3–3/4" i.p.s.,
put operating mode selector to stereo,
put on Dual standard tape H for track adjustment (yellow leader),
press start key.
The monitor output of the two channels 1 – 4 and 3 – 2 are paralleled.
Turn the setscrew next to the playback head to trim the latter to max. voltage. Ensure that the voltage is balanced to maximum.

4.06 Playback frequency from standard tape

Switch unit to 3–3/4" i.p.s.,
put operating mode selector to stereo,
put on Dual standard tape 9 H with standard level of 333 Hz (blue leader) and 10 kHz frequency response section (grey leader),
press start key.
It should be borne in mind that the 10 kHz section on the tape is – 20 dB lower than the 333 Hz section.
Referred to 333 Hz, the 10 kHz section may deviate by $^{+2}_{-4}$ dB.

5. HF generator and recording:

Prerequisites for all overall tape measurements

The electronic voltmeters are connected to the monitor jack for all overall tape measurements:

Contact 2 = ground
3 = left channel (track 1 – 4)
5 = right channel (track 3 – 2)

The monitor switch should be switched to the check position (tape). When relevelling completely anew, follow the sequence below:

5.01 HF generator frequency

Press the record key,
put the operating mode selector to stereo, turn trimming condensers C 117 and C 217 into the center position or back to their original setting. Measure the generator frequency with the absorption frequency meter near to the erase head.

The measurement is carried out by the frequency comparison method. The erase head voltage is fed in to the y-input of an oscilloscope and a frequency of 95 kHz from a generator is applied to the x-input. Levelling is now carried out until a circle or an ellipse appears on the oscilloscope screen. Set the generator frequency on the core of the oscillator coil L 1 to

$$f_{HF} = 95 \text{ kHz.}$$

There are two alternative core positions: the one at which the core still projects out of the pot should be selected.

When the operating mode selector is in positions 1 – 4 and 3 – 2, the HF generator frequency must remain with the following limits:

$$f_{HF} = 95 \text{ kHz} \pm 8 \text{ kHz.}$$

5.02 Preliminary setting of HF pre-magnetizing

Switch unit to 3-3/4" i.p.s.,
press the record key,
put operating mode selector to stereo,
put on Dual standard tape 9 H DIN with blank tape section 264 Z (red leader),
turn volume control to maximum,
press start key.

With both channels paralleled, apply approx. 4 mV at 333 Hz to the radio jack.

Contacts 3 and 5 = signal
Contact 2 = ground

The trimming condensers C 117 (track 1 – 4) and C 217 (track 3 – 2) are set to obtain max. output voltage.

5.03 Erase head voltage

Switch unit to recording.
The erase head voltage must be as follows when the operating mode selector is in the following positions: stereo, 1 – 4 and 3 – 2:

$$U_{ER} = 10 \text{ V}$$

5.04 HF wave trap

Put the speed selector switch to 3-3/4" i.p.s. and with tape end switch-off blocked
press start key.
Trim L 102 (track 1 – 4) and L 202 (track 3 – 2) to obtain HF minimum of the output voltage.

5.05 Track level of recording head

Switch unit to 3–3/4" i.p.s.,
press the record key,
put operating mode selector to stereo,
put on Dual standard tape 9 H DIN, with blank tape section 264 Z (red leader),
turn volume control to maximum
press the start key.
With both channels paralleled, apply approx. 4 mV at 333 Hz to the radio jack.

Contacts 3 and 5 = signal
Contact 2 = ground

For track 3 – 2 the output voltage is set to maximum by turning the grub screw in front of the recording head.
The grub screw behind the recording head must now be adjusted by the same amount as the front one to restore the original vertical position of the reocrding head level.

5.06 Uniform recording level

Switch unit to 3–3/4" i.p.s.,
press the record key,
put operating mode selector to stereo,
put on Dual standard tape 9 H DIN with blank tape section, 264 Z (red leader),
turn volume control to maximum,
press start key.

Preliminary setting of HF pre-magnetizing in acc. with 5.02 must already have been done.

With both channels paralleled, apply approx. 4 mV at 333 Hz to the radio jack.

Contacts 3 and 5 = signal
Contact 2 = ground

Set the replay voltages of both channels to uniform level at R 124 (track 1-4).

5.07 Trimming the recording head

Switch unit to 3 – 3/4" i.p.s.,
press record key,
put operating mode selector to stereo,
put on Dual standard tape 9 H DIN with blank tape section, 264 Z (red leader),
turn volume control to maximum,
press start key.

The monitor output for both channels is paralleled. With both channels paralleled, apply approx. 4 mV at 10 kHz to the radio jack input.

Contacts 3 and 5 = signal
Contact 2 = ground

Balance to max. replay output voltage by means of the screw on the left next to the recording head. Ensure that the voltage is balanced to maximum.

5.08 HF pre-magnetization

Switch the unit to 3-3/4" i.p.s.,
press the record key,
put the operating mode selector to stereo,
put on a Dual standard tape 9 H DIN with blank tape section, 264 Z (red leader),
turn up the volume control to maximum,
press the start key.

With both channels are paralleled, apply approx. 4 mV (constant) to the radio jack from the audio generator.

Contacts 3 and 5 = signal
Contact 2 = ground

Set the overall frequency response of both channels by turning the appropriate trimming condensers C 117 and C 217 to obtain linear frequency of the replay voltages at 333 Hz and 10 kHz.

5.09 Maximum volume control

Switch the unit to 3-3/4" i.p.s.,
put the operating mode selector to stereo,
put on a Dual standard tape 9 H DIN with blank tape section, 264 Z (red leader),
press the record key,
turn the volume control to maximum,
press the start key.

With both channels are paralleled, apply 333 Hz to the radio jack. Start with $U_I = 40$ mV.

Contacts 3 and 5 = signal
Contact 2 = ground

Measure the distortion factor K_3 of the replay voltage at the monitor jack.

Adjust the input voltage U_I so that $K_3 = 2$ % for the one channel and $K_3 \leqq 2$ % for the other channel.

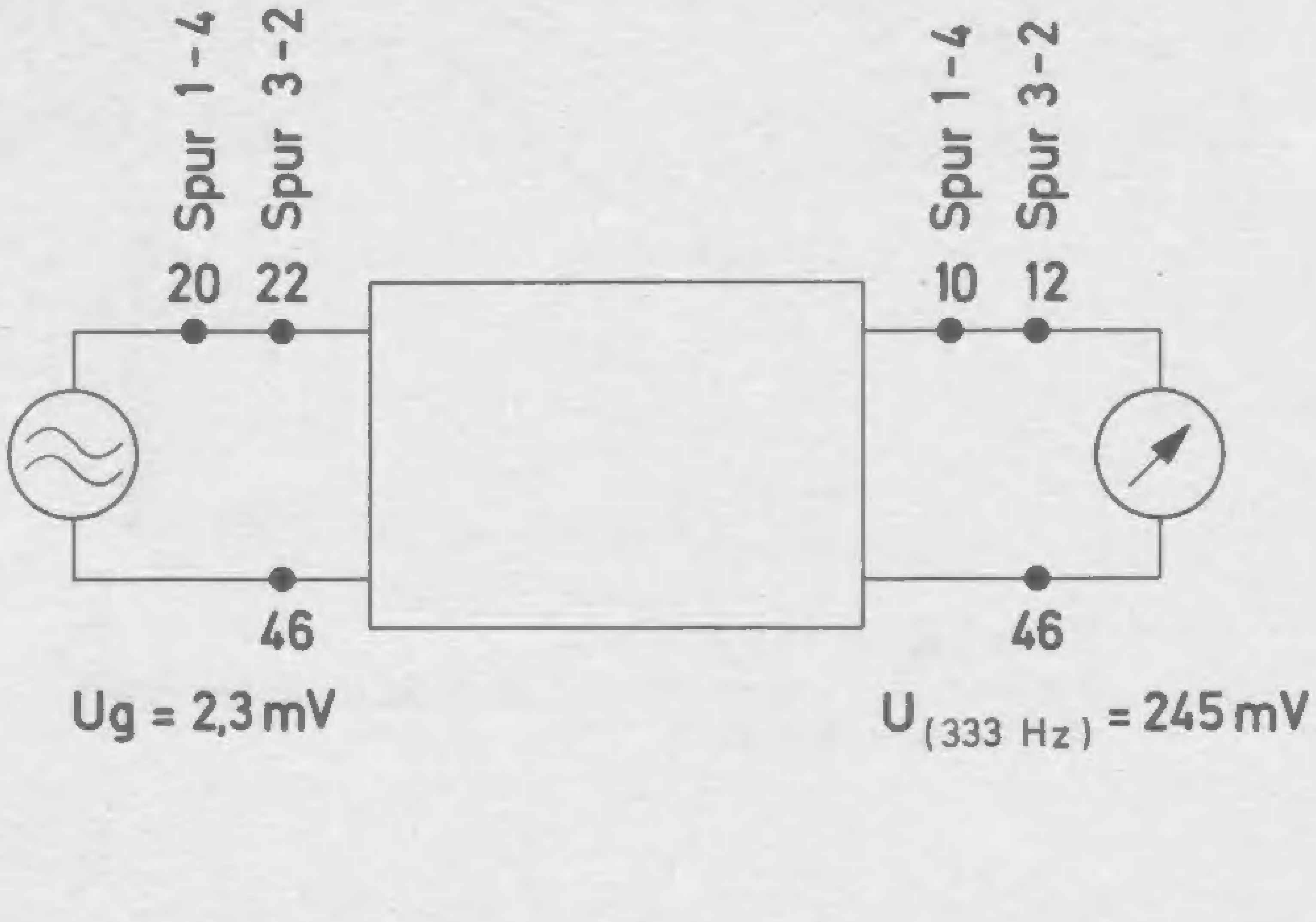
The deflection of the volume control instruments is set to 0 dB on the controllers R 126 (track 1 — 4) and R 226 (track 3 — 2) for the input voltage thus determined.

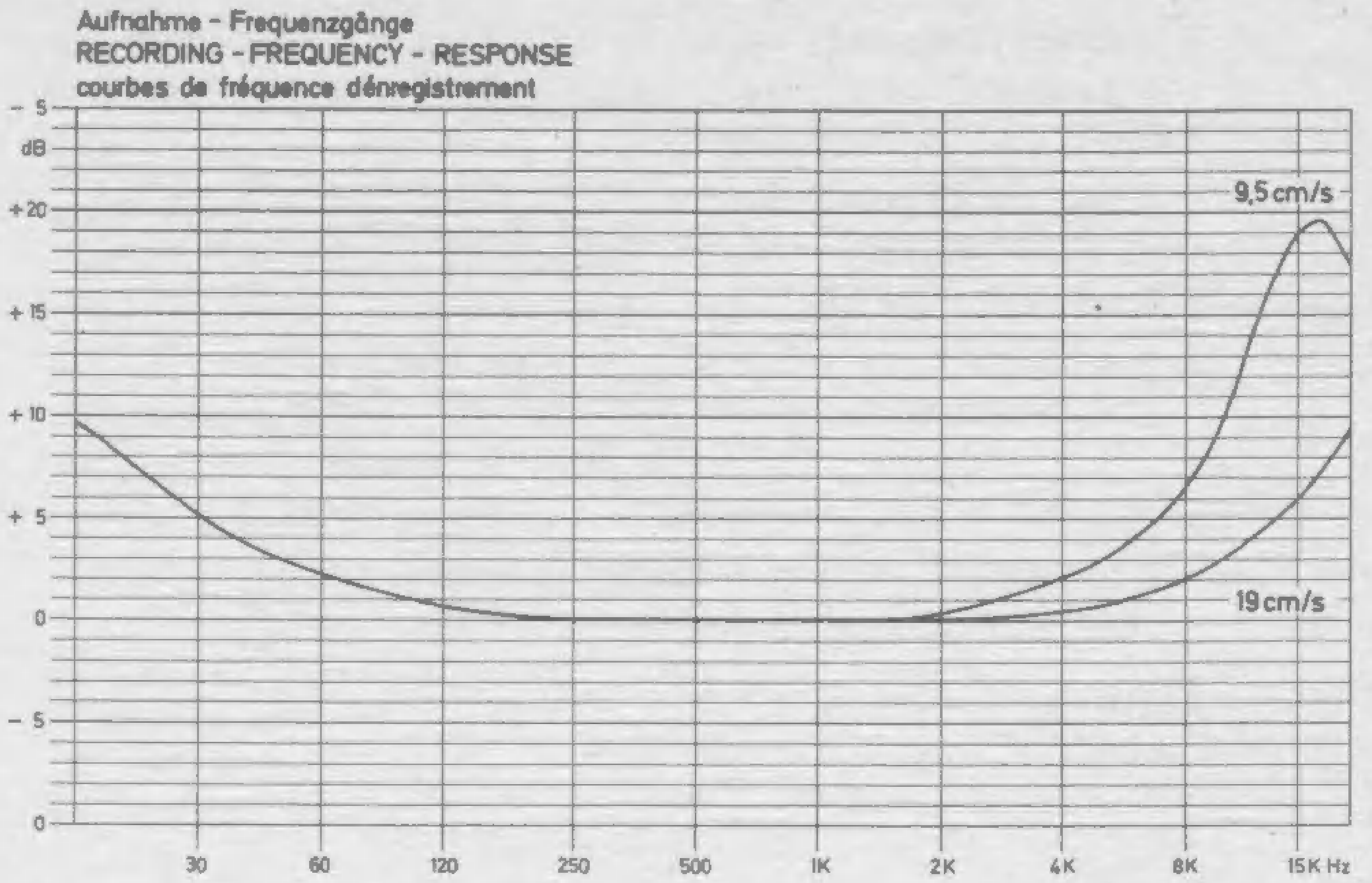
While doing this, tap the instruments gently to obviate any bearing friction.

The replay voltages for 0 dB level must be:

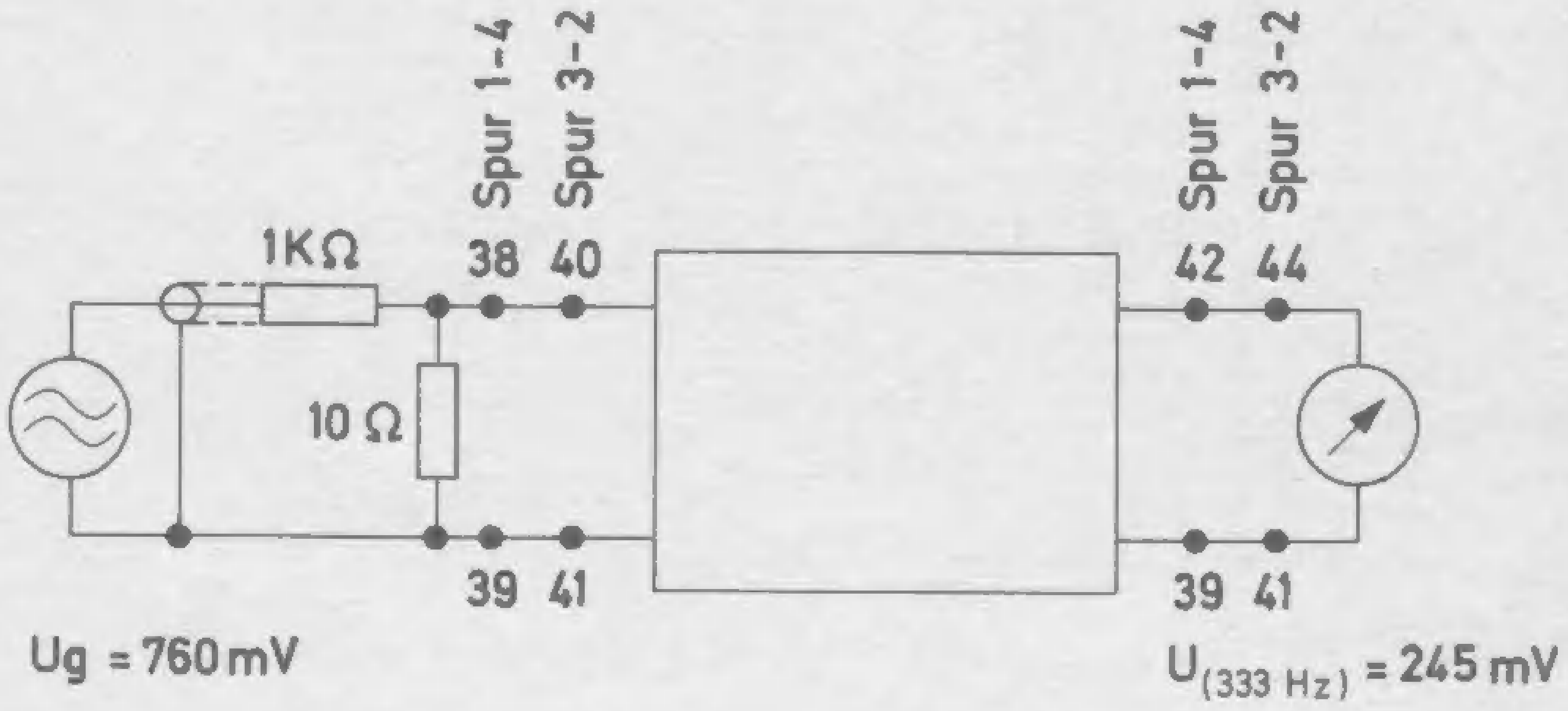
U_O dB — level ≧ 500 mV

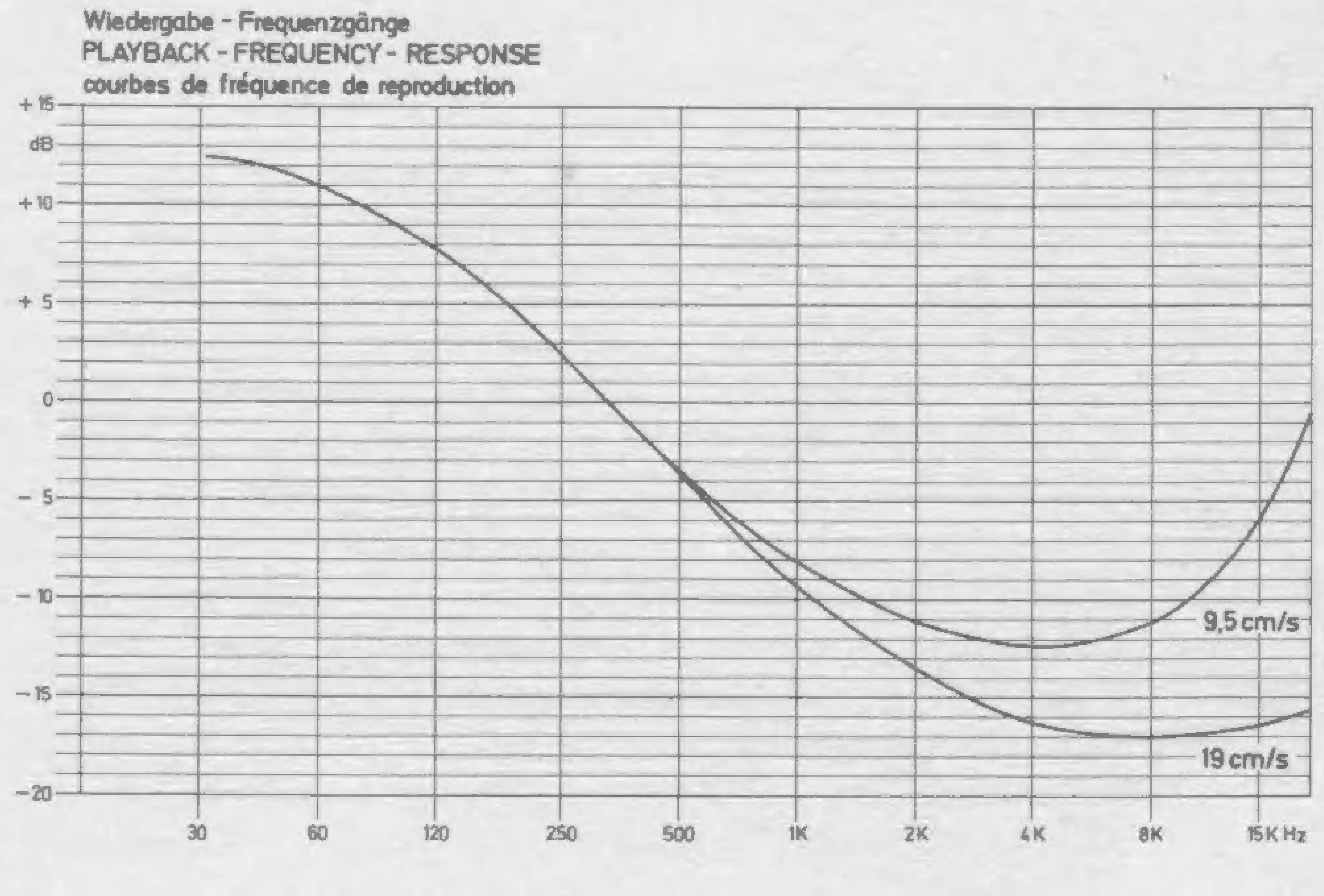
6. Recording frequency responses





7. Replay frequency responses





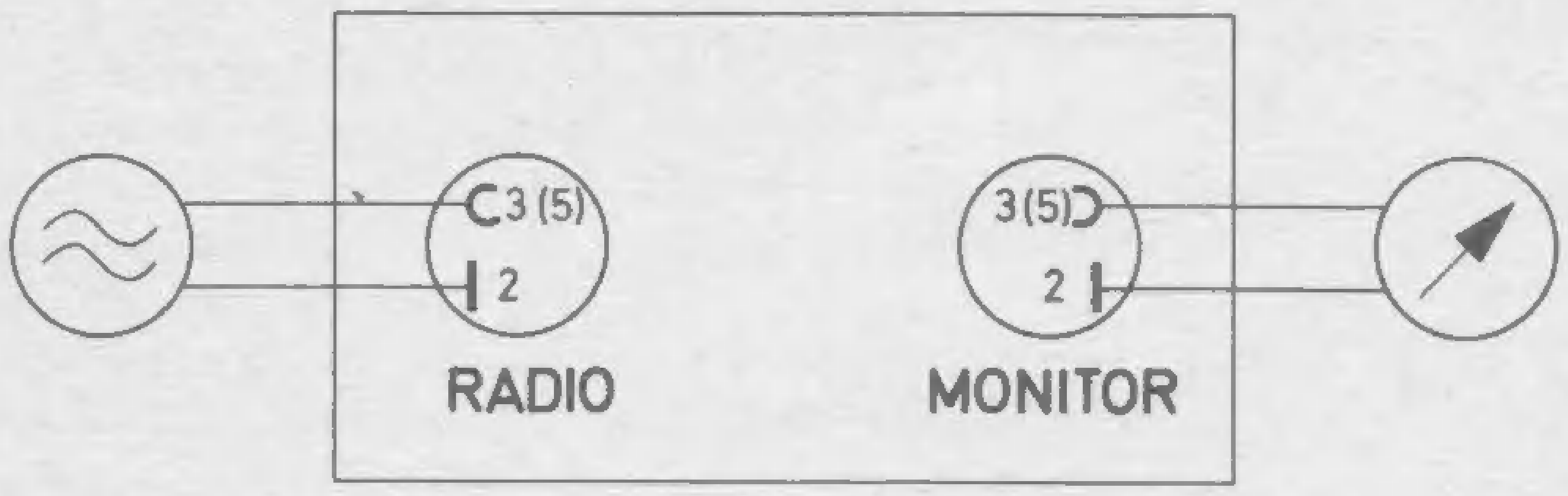
8. Overall frequency response

Put on a Dual standard tape 9 H DIN with blank tape section, 264 Z (red leader),
press the record key,
turn the volume control to maximum,
press the start key.

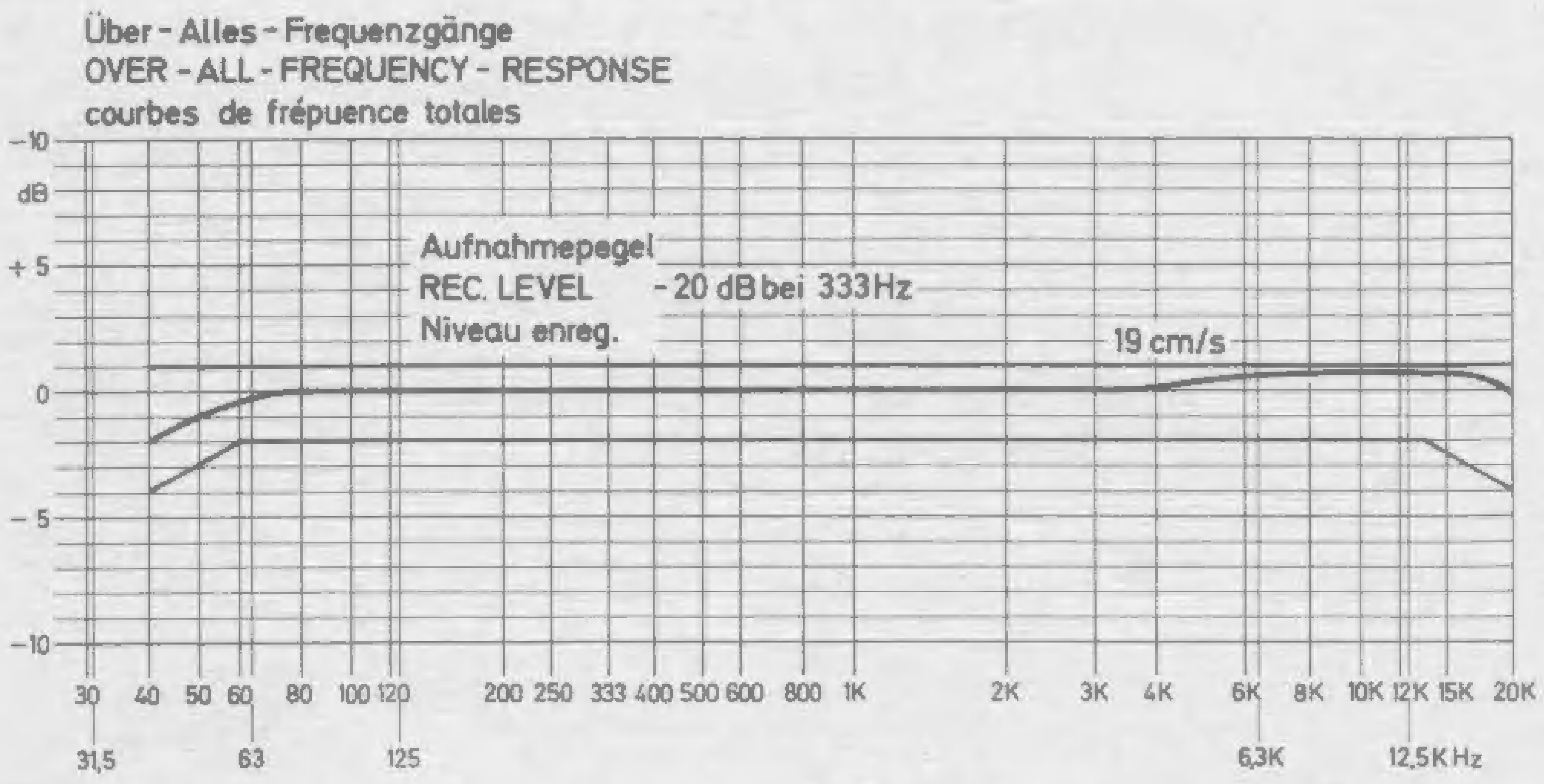
With both channels are paralleled, apply approx. 4 mV (constant) to the radio jack from the audio generator.

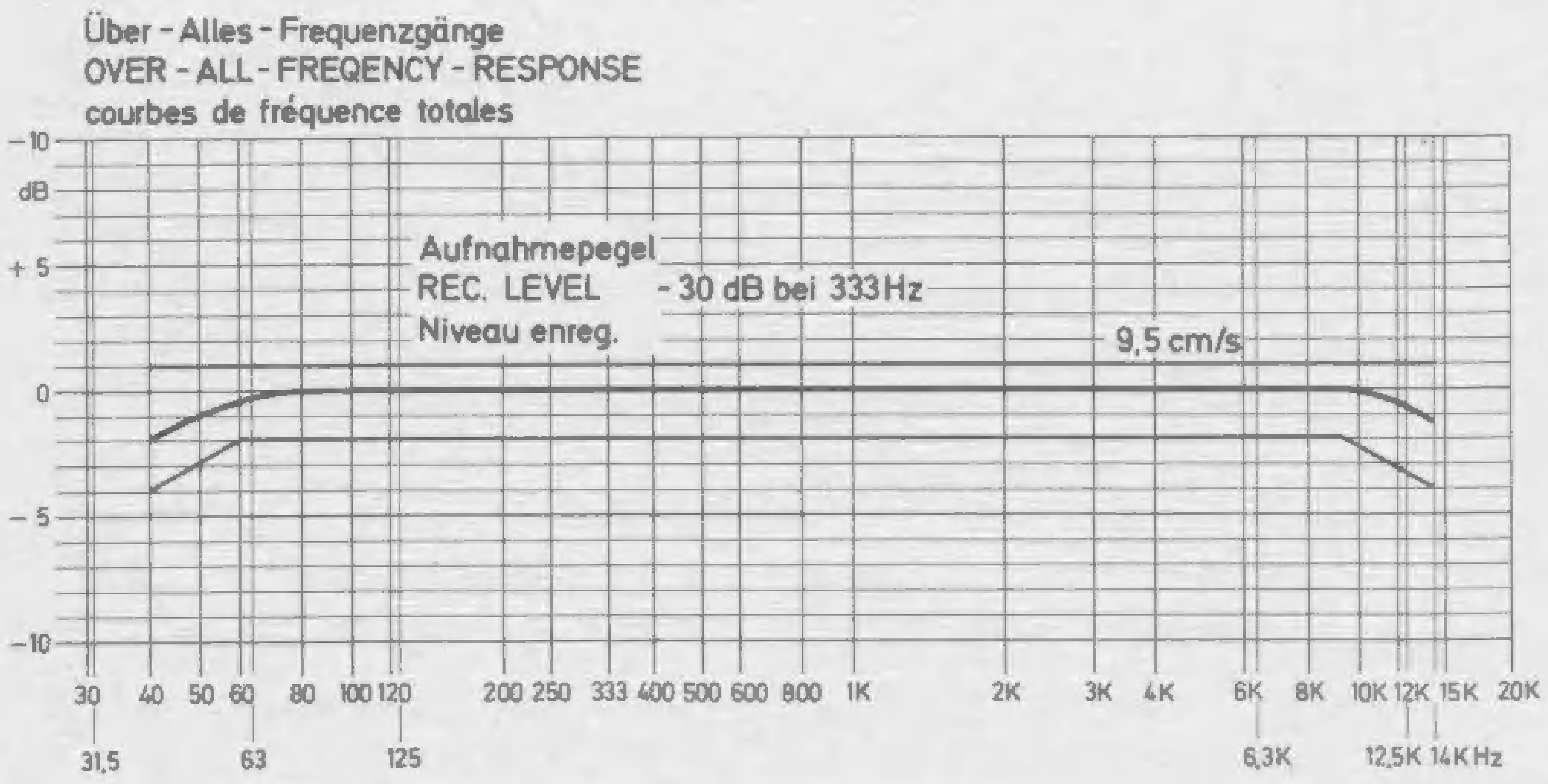
Contacts 3 and 5 = signal
Contact 2 = ground

The overall frequency response should fall within the following tolerance ranges.



RECORD, TAPE, START





9. Replacing and adjusting the replay head

The new replay head is supplied complete with shielding and rocker.

Caution: In the lower part of the rocker there is a ball which is a special part of every replay head and which determines the exact track level of the head. This obviates adjusting the track level. Never replace the ball arbitrarily.

The replay head is first screwed on so that it is positioned as vertically as possible.

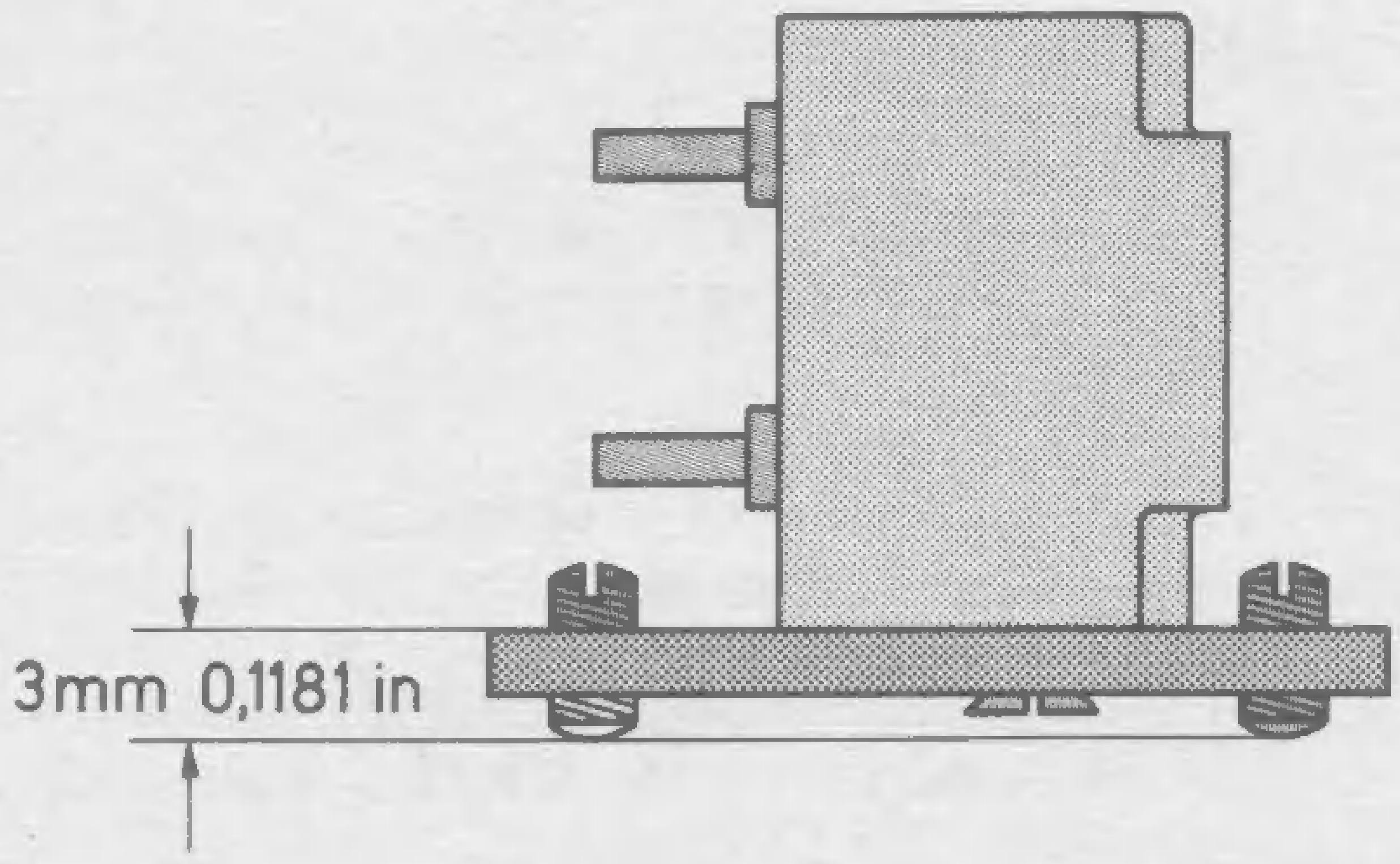
The tape guide system is then adjusted by the setscrew behind the rocker in such a manner that a normal double or triple play tape passes smoothly through the tape guide at the capstan bearing when the start key is pressed. The tape must not show any inclination to buckle at its edges even with good lighting. Press the start key several times and check the adjustment by using a second tape.

The electrical measurements should be carried out in accordance with the section: **4. Replay.**

10. Replacing and adjusting the recording head

The new recording head is supplied complete with shielding and rocker.

Caution: The two grub screws in front of and behind the recording head are preset in the factory.



The recording head is first screwed on so that it is positioned as vertically as possible.

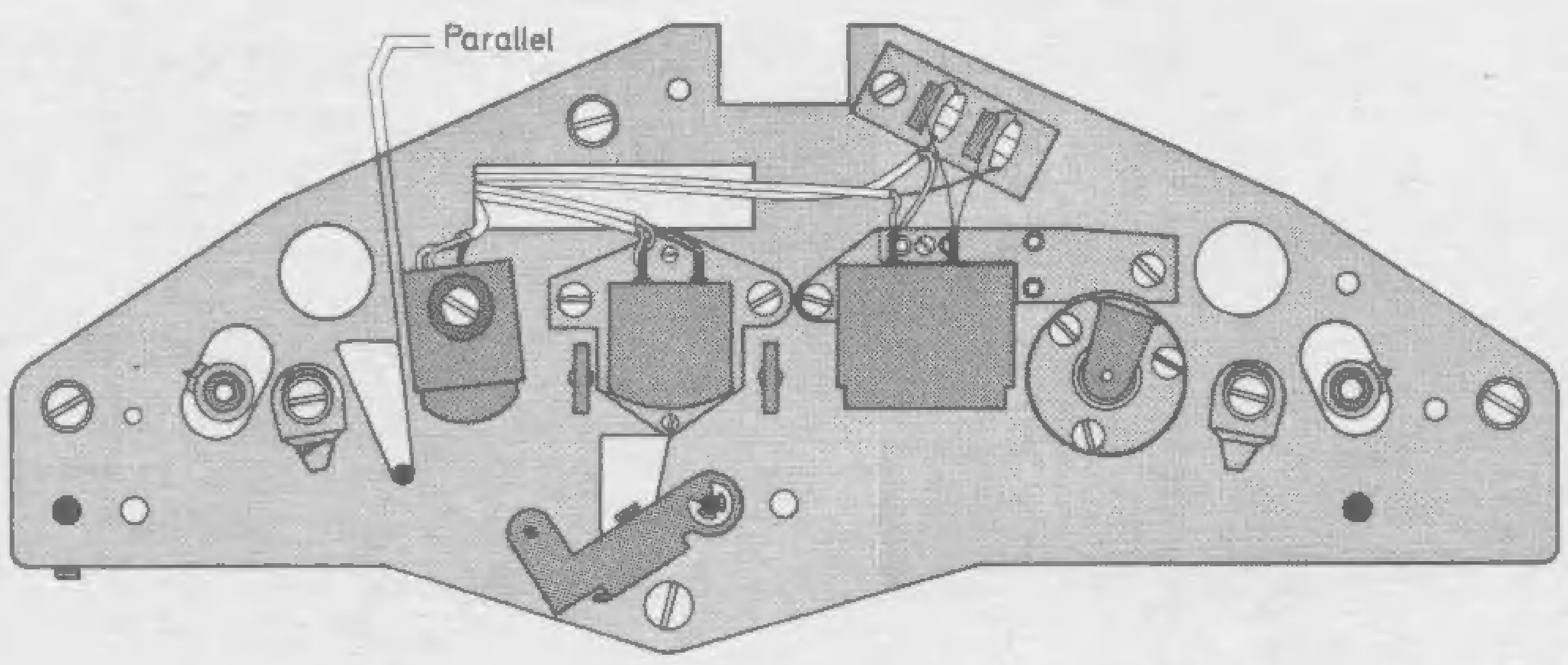
5. HF Generator and Recording.

11. Replacing the erase head

If the winding of the old erase head is still in order, it is recommended that prior to removing the old head the HF pre-magnetization voltage of both tracks be measured with the electronic voltmeter and noted down – which si done in the stereo recording position – so that the voltage can be set to the same values as before by means of the trimming condensers C 117 and C 217 after the head has been replaced. In other respects the new erase head should be set as stated in Section 5

5.01
5.08
5.09

Tighten up the screw only moderately, so that the plastic casing does not become distorted, then secure the screw with varnish.



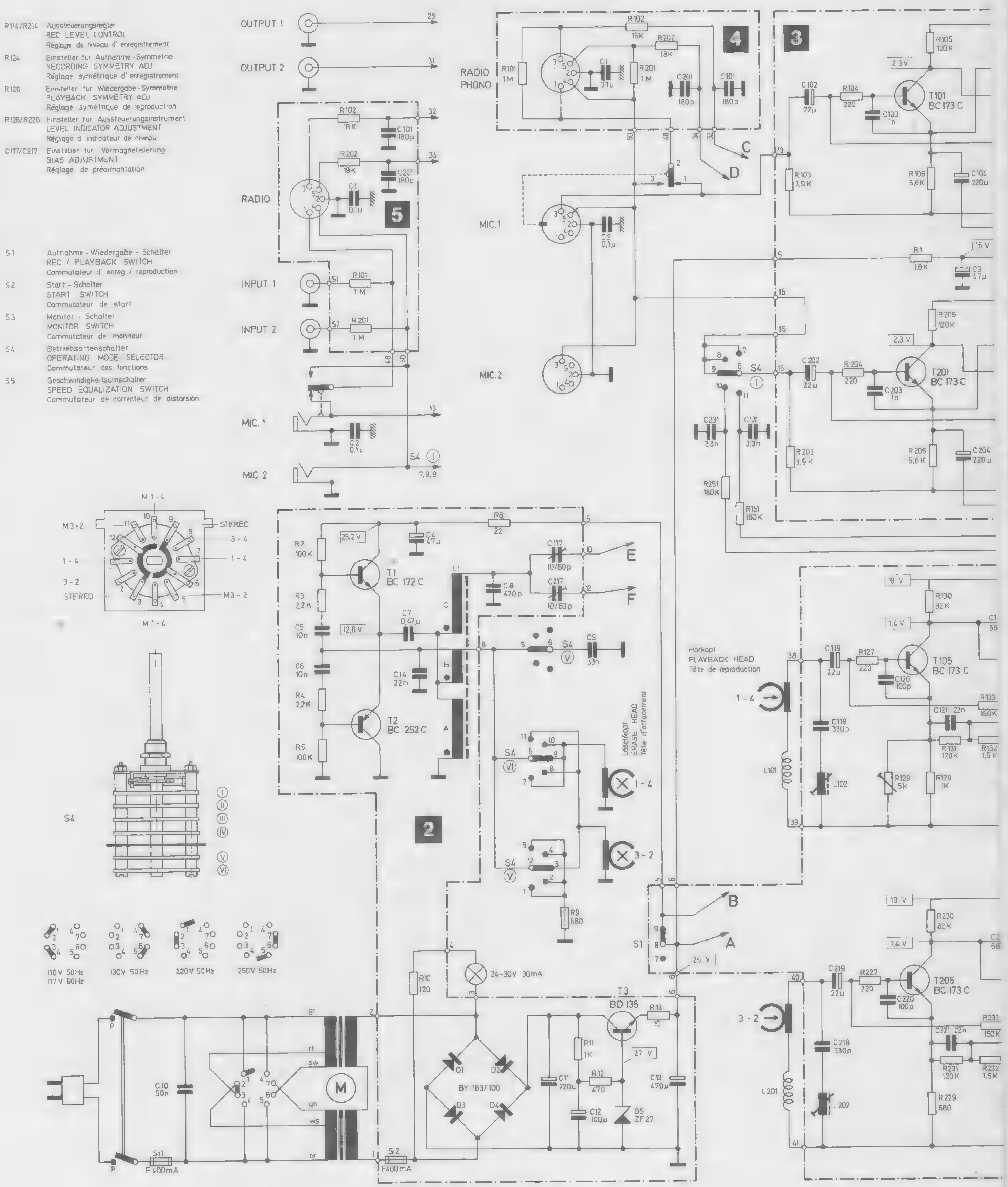
12. Replacing the oscillator coil

To replace the oscillator coil, proceed as stated in **HF Adjustment, Section 5.**

Dual Tonbandgerät TG 29 Tape Recorder T

Gezeichnet in Stellung Start, Aufnahme Radio, Stereo, 19cm/s CONTACTS IN POSITION START, RE

Ausführung mit RCA und PHONE - Buchsen
SPEZIAL EXECUTION WITH RCA - AND PHONE JACKS

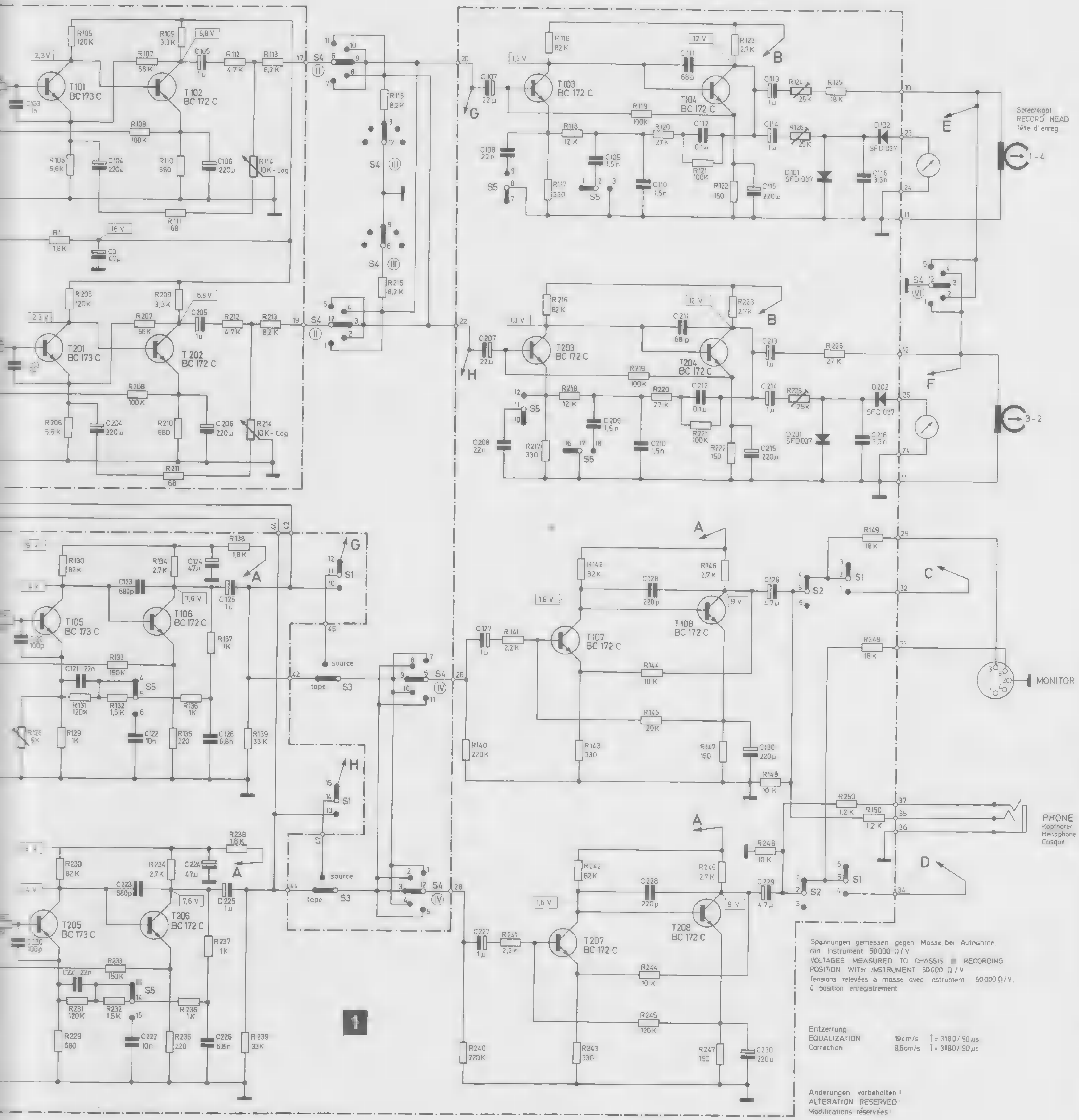


R114/R214	Aussteuerungsregler REC LEVEL CONTROL Réglage de niveau d' enregistrement
R124	Einsteller fur Aufnahme-Symmetrie RECORDING SYMMETRY ADJ Réglage symétrique d' enregistrement
R128	Einsteller für Wiedergabe-Symmetrie PLAYBACK SYMMETRY ADJ Réglage symétrique de reproduction
R126/R226	Einsteller fur Aussteuerungsinstrument LEVEL INDICATOR ADJUSTMENT Réglage d' indicateur de niveau
C117/C217	Einsteller für Vormagnetisierung BIAS ADJUSTMENT Réglage de préaimantation

S1	Aufnahme - Wiedergabe - Schalter REC / PLAYBACK SWITCH Commutateur d' enreg / reproduction
S2	Start - Schalter START SWITCH Commutateur de start
S3	Monitor - Schalter MONITOR SWITCH Commutateur de moniteur
S4	Betriebsartenschalter OPERATING MODE SELECTOR Commutateur des fonctions
S5	Geschwindigkeitsumschalter SPEED EQUALIZATION SWITCH Commutateur de correcteur de distorsion

pe Recorder TG29 Enregistreur sur bande TG29

NTACTS IN POSITION START, REC RADIO, STEREO, 19cm/s Contacts en position start, enregistr. radio, stereo, 19cm/s



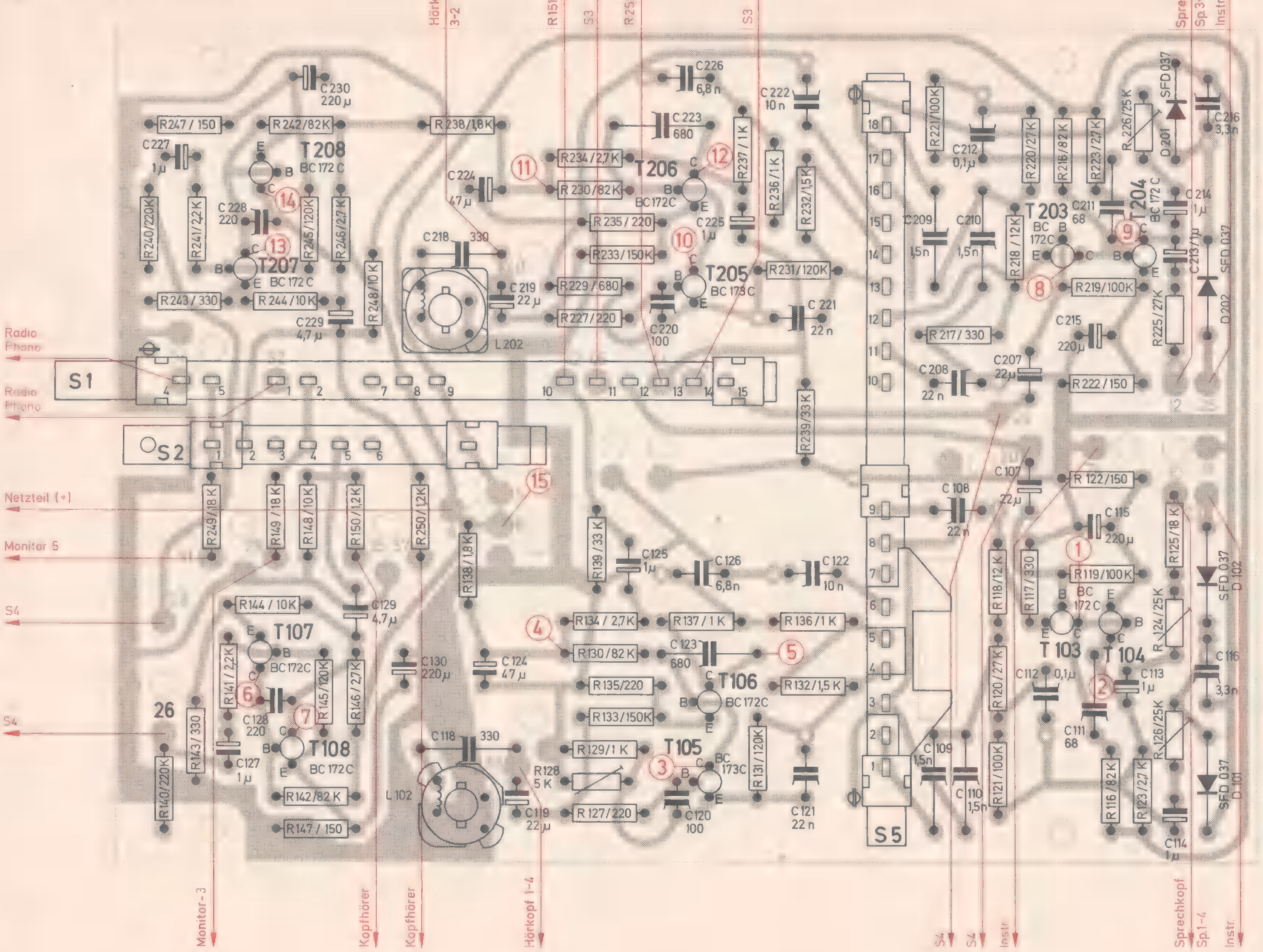
Spannungen gemessen gegen Masse, bei Aufnahme, mit Instrument 50000 Ω/V
VOLTAGES MEASURED TO CHASSIS ▨ RECORDING POSITION WITH INSTRUMENT 50000 Ω/V
Tensions relevées à masse avec instrument 50000 Ω/V, à position enregistrement

Entzerrung		
EQUALIZATION	19cm/s	T = 3180/50µs
Correction	9,5cm/s	T = 3180/90µs

Änderungen vorbehalten!
ALTERATION RESERVED!
Modifications réservées!

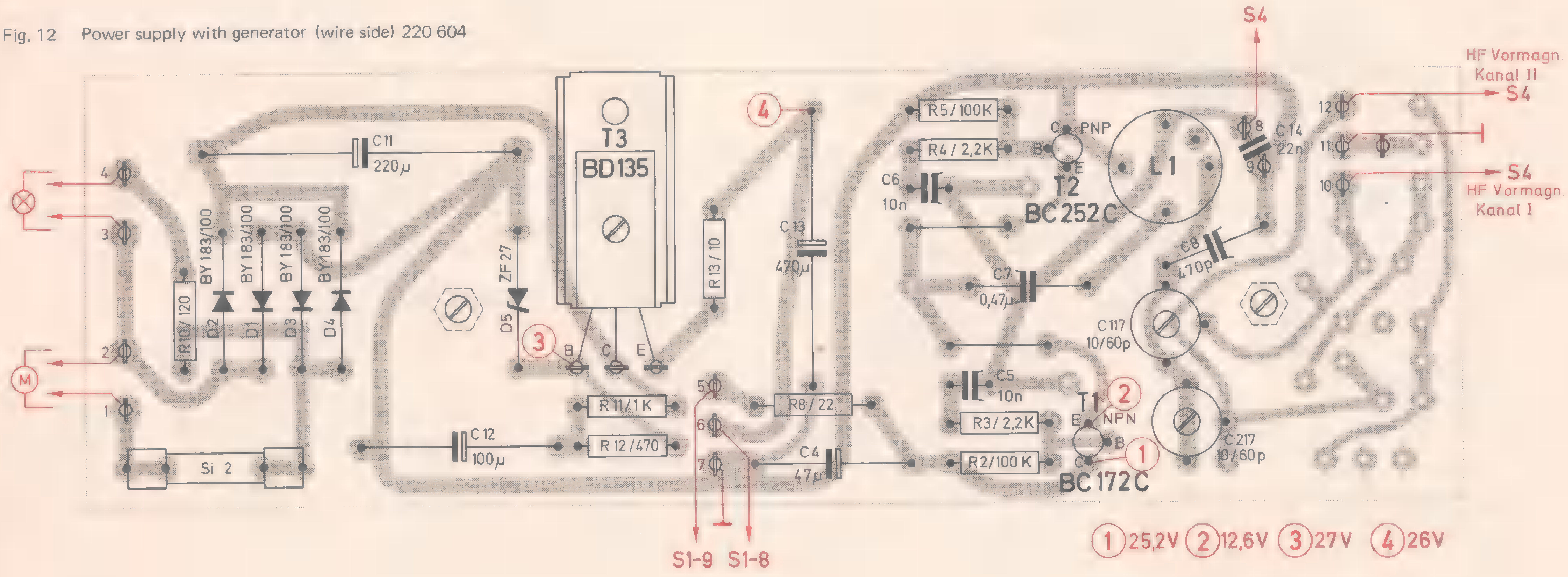
PRINTED IN GERMANY 220515 Ausgabe ! 2 2 70 CH

Fig. 11 Amplifier board (wire side)



①	1,3 V
②	12 V
③	1,4 V
④	19 V
⑤	7,6 V
⑥	1,6 V
⑦	9 V
⑧	1,3 V
⑨	12 V
⑩	1,4 V
⑪	19 V
⑫	7,6 V
⑬	1,6 V
⑭	9 V
⑮	26 V

Fig. 12 Power supply with generator (wire side) 220 604



①25,2V ②12,6V ③27V ④26V

Fig. 13 Input amplifier, compl. (wire side) 220 575

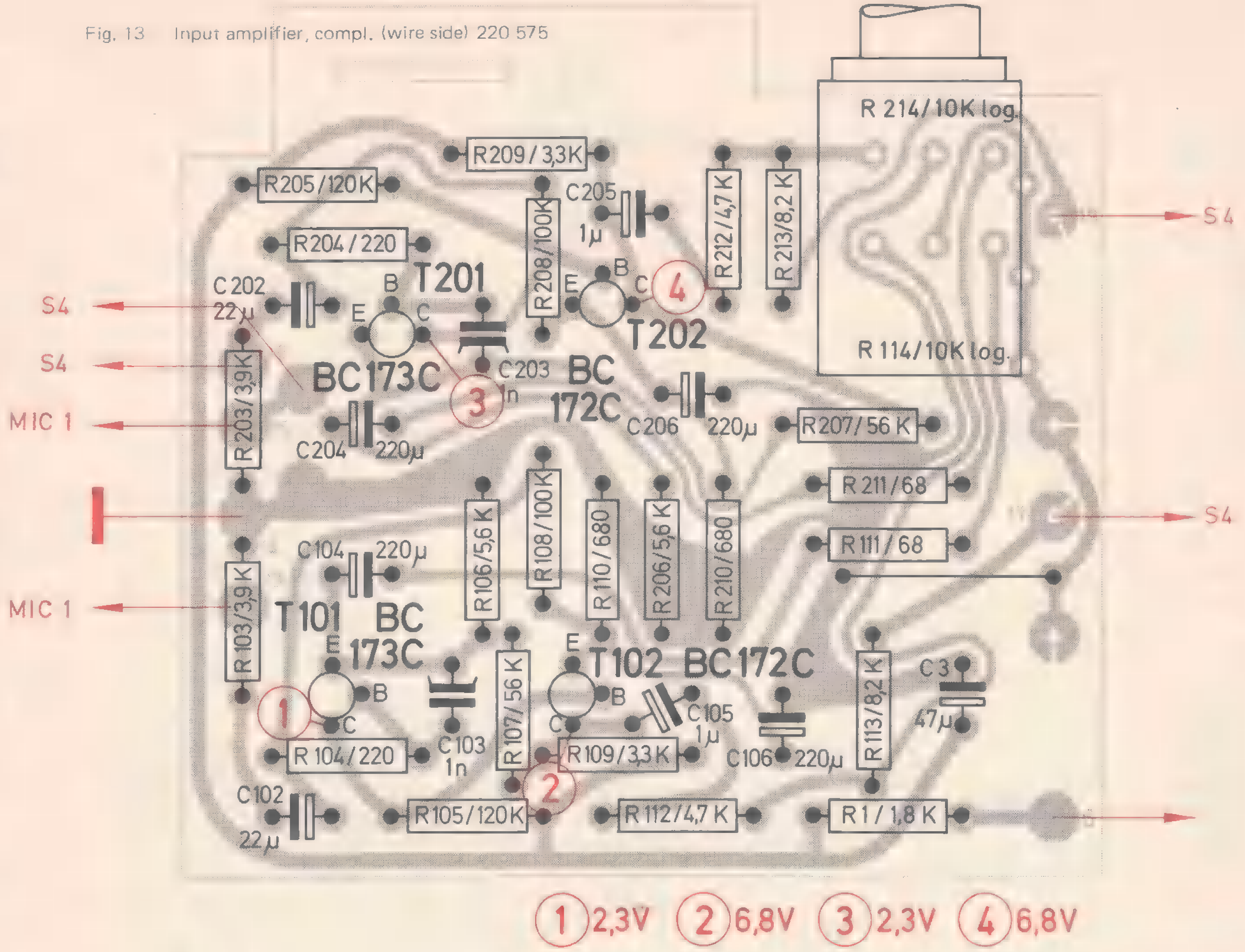


Fig. 14 Printed wiring board for backside panel
Europa (wire side) 220 617

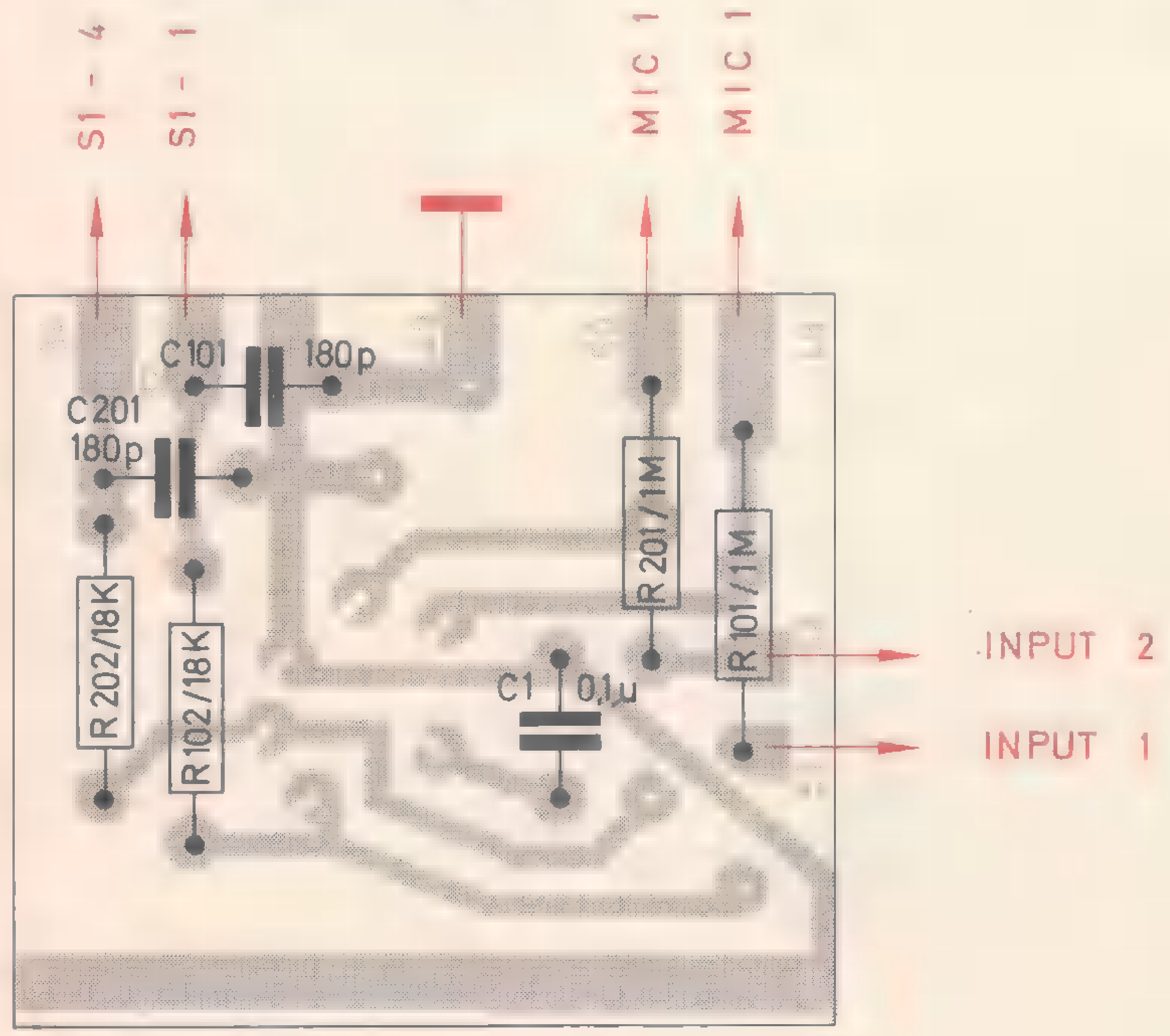
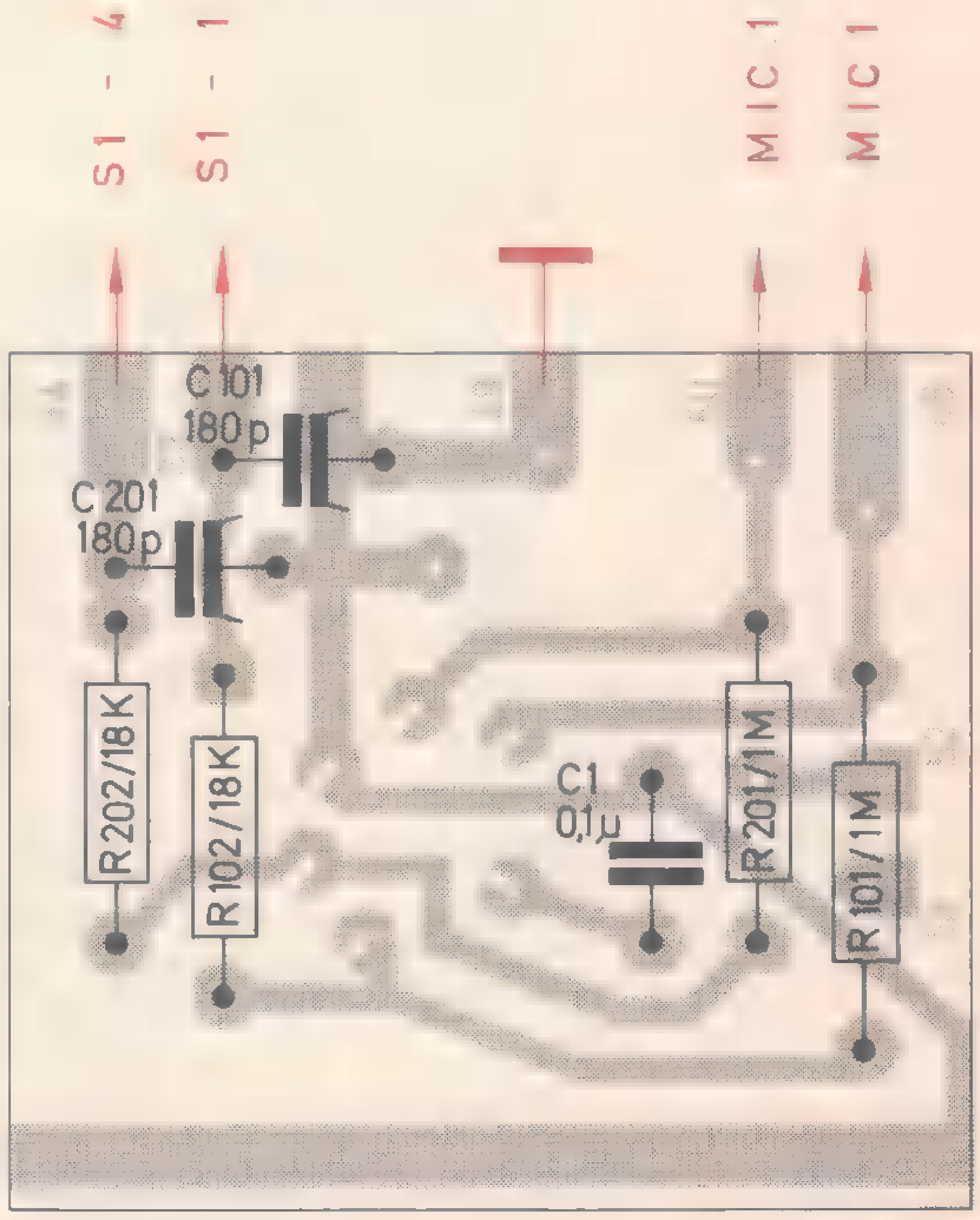


Fig. 15 Printed wiring board for backside panel
U.S.A. (wire side) 220 549



Spare parts CTG 29

Pos.No.	Part No.	Description	Quantity	
1	202 277	Philips screw with crosshead AM 2.6 x 5	2	
2	217 554	Ring	2	
3	217 555	Compression spring	2	
4	217 553	Clamping sleeve	2	
5	214 297	Friction ring	2	
6	222 249	Spindle, compl.	2	
7	210 591	Washer 3.2 / 8 / 0.2 Hp	6	
8	214 263	Bearing, compl.	2	
9	210 591	Washer 3.2 / 8 / 0.2 Hp	6	
10	210 145	"C"-clip 2.3	9	
11	210 717	Washer 10.1 / 16 / 1 St	2	
12	210 371	Hex nut M 10 x 1	2	
13	205 484	Brake cord, compl.	2	
14	214 395	Pressure bolster	1	
15	210 194	Retainer ring G 2 x 0.6	6	
16	205 725	Shift lever	1	
17	214 390	Guide rod	1	
18	214 494	Shift fork compl. with guide rod	1	
19	205 722	Tension spring	1	
20	203 920	Philips screw with srocchead AM 3 x 5	6	
21	220 300	Dress plate, compl.	1	
22	214 476	Cover	4	
23	203 920	Philips screw with crosshead AM 3 x 5	6	
24	218 020	Tape head cover, compl.	1	
25	216 530	Cover strip, compl.	1	
26	210 342	Philips screw with crosshead AM 3 x 6	2	
27	210 361	Hex nut M 3	4	
28	214 405	Side wall, left	1	
29	214 361	Couter belt	1	
30	209 940	Rubber bushing	2	
31	214 319	Securing ring	2	
32	220 280	Tension spring	2	
33	218 018	Brake lever left, compl.	1	
34	214 313	Shaft, compl.	2	
35	210 657	Washer 5.1 / 10 / 0.5 St	3	
36	210 369	Hex nut M 5	2	
37	214 491	Switch slide, compl.	1	
38	203 476	Washer 1.55 / 3.5 / 0.5 St	1	
39	214 306	Compression spring	1	
40	210 143	"C"-clip 1.5	8	
41	214 305	Stop rod	1	
42	215 784	Washer 2.1 / 5 / 0.5 Po	1	
43	205 836	Shift rod, above	1	
44	204 976	Switch angle II, compl.	1	
45	210 188	Spring washer 5.3 / 10	1	
46	210 597	Washer 3.2 / 8 / 0.5 St	1	
47	210 480	Machine screw AM 3 x 6	9	
48	210 499	Machine screw AM 3 x 30	2	
49	205 737	Spacer, above	2	
50	205 357	Eccentric busing	2	
51	205 738	Tape guide	2	
52	205 740	Spacer, below	2	
53	210 396	Sunk screw AM 4 x 8	3	
54	210 453	Machine screw AM 2.6 x 8	1	
55	214 331	Adjustment bolt	1	
56	214 330	Release rod	1	
57	205 762	Special screw	1	
58	205 495	Release lever, compl.	1	
59	210 146	"C"-clip 3.2	4	
60	214 326	Stop plunger, compl.	1	
61	205 757	Tension spring	1	
62	210 145	"C"-clip 2.3	9	
63	205 823	Reverse lever II	1	
64	214 339	Switch rod	1	
65	210 467	Machine screw AM 2.6 x 22	1	
66	215 572	Washer 2.8 / 8 / 0.5 St	1	
67	219 930	Tape head shielding	1	
68	206 130	Erase head LK 16, compl.	1	
69	203 475	Sunk screw AM 3 x 8	1	
70	205 747	Threaded pin	3	
71	220 221	Special screw	1	
72	220 281	Compression spring	1	
73	222 242	Recording head, compl. with rocker	1	
74	204 975	Power switch key, compl.	1	

Fig. 16 Exploded view, parts above chassis plate

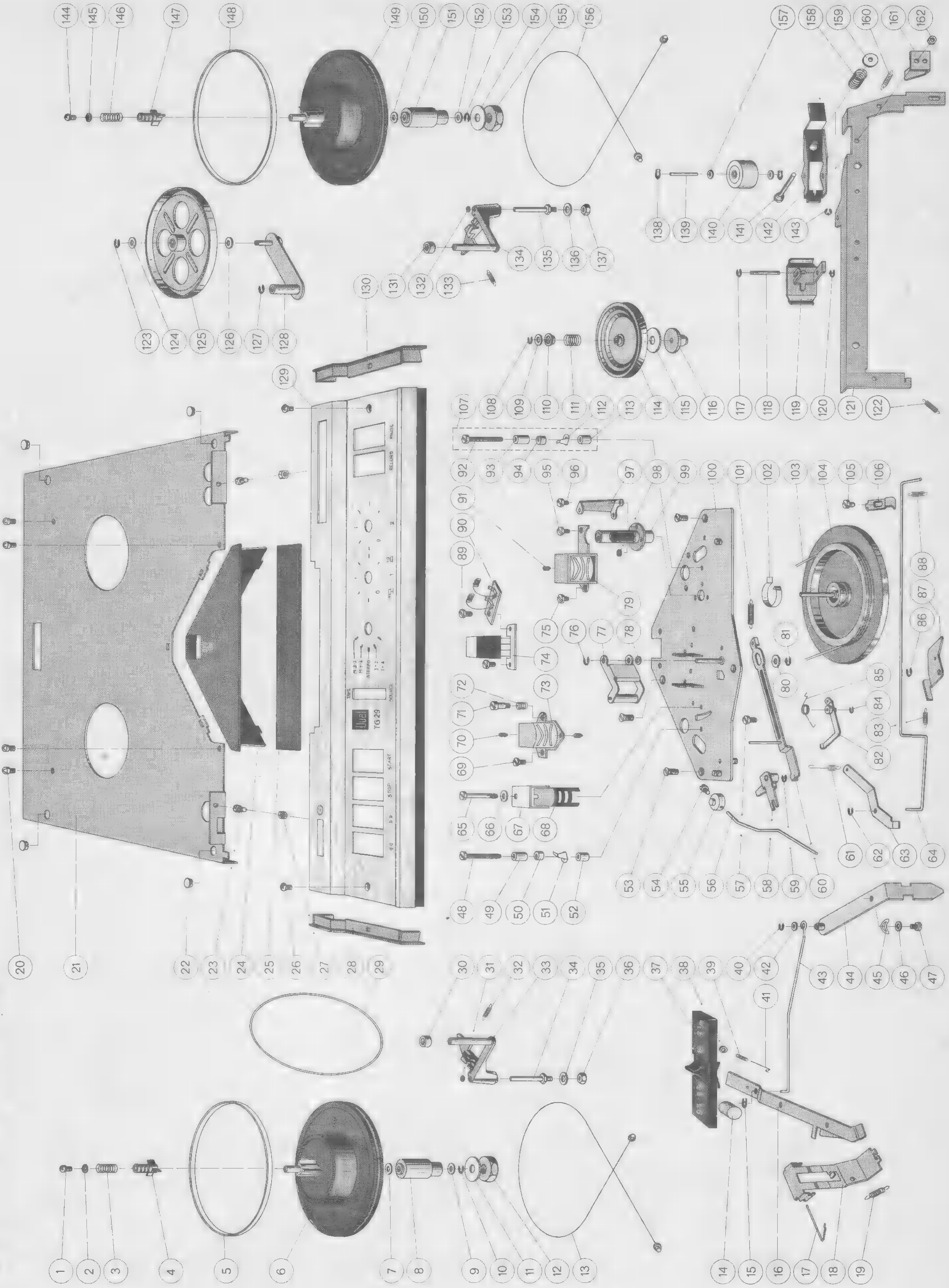
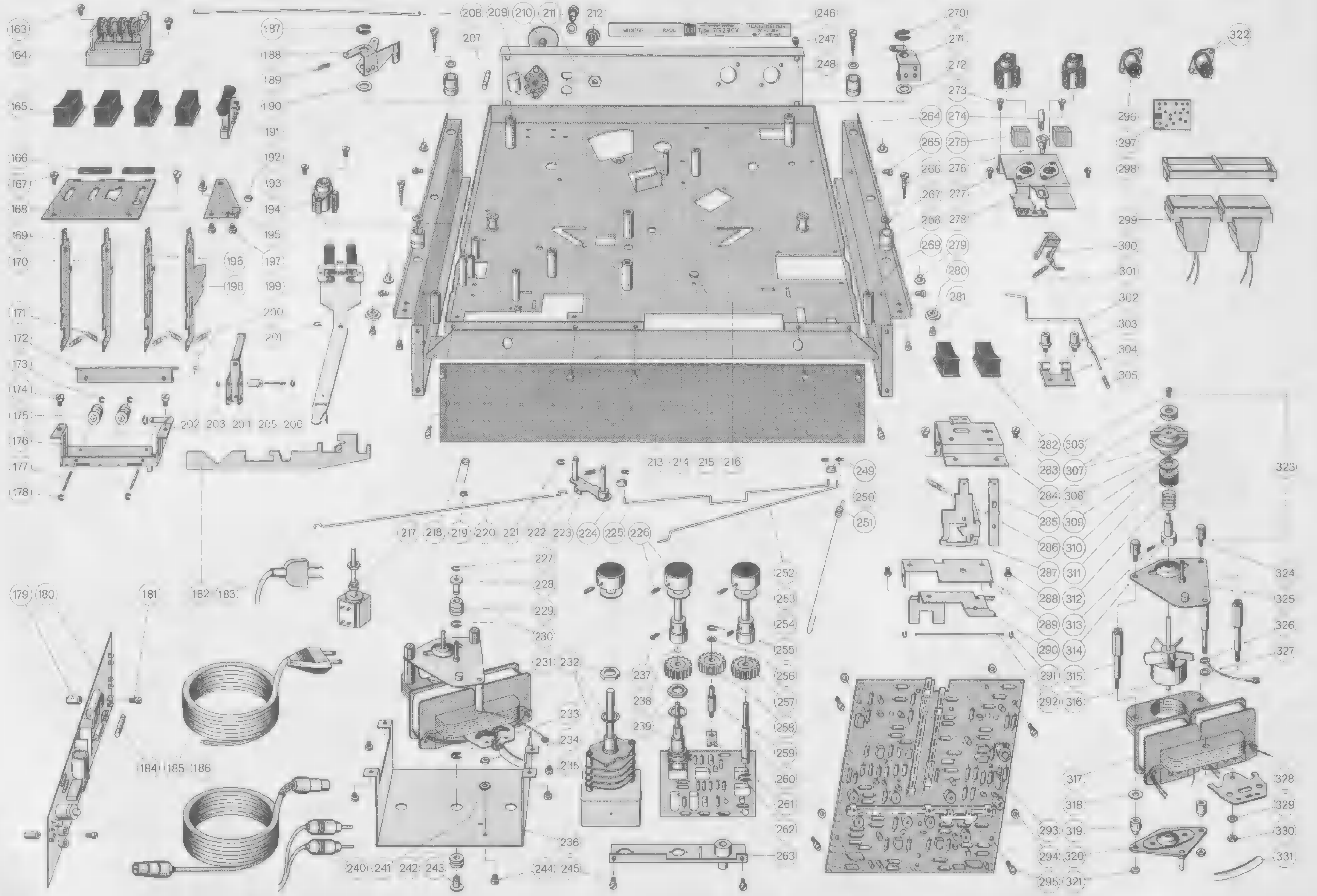


Fig. 17 Exploded view, parts below chassis plate



Pos.No.	Part. No.	Description	Quantity	
75	210 449	Machine screw AM 2.6 x 5.0	1	
76	210 145	"C"-clip 2.3	9	
77	214 423	Shut-off lever, compl.	1	
78	210 584	Washer 3.2 / 6 / 0.5 St	1	
79	222 241	Playback head, compl. with shielding	1	
80	210 657	Washer 5.1 / 10 / 0.5 St	3	
81	210 147	"C"-clip 4.0	2	
82	209 192	Angled lever	1	
83	205 817	Tension spring	1	
84	210 143	"C"-clip 1.5	8	
85	205 755	Torsion spring	1	
86	210 145	"C"-clip 2.3	9	
87	205 822	Reverse lever I	1	
88	205 820	Tension spring	1	
89	210 475	Machine screw AM 3 x 5	3	
90	222 246	Terminal board, compl. with bucking coils	1	
91	205 747	Threaded pin	3	
92	210 499	Machine screw AM 3 x 30	2	
93	205 737	Spacer, above	2	
94	205 357	Eccentric bushing	2	
95	210 469	Machine screw AM 3 x 3	1	
96	210 475	Machine screw AM 3 x 5	7	
97	220 936	Cocking spring, compl.	1	
98	200 633	Lockwasher	1	
99	214 302	Capstan bearing, compl.	1	
100	220 296	Tape head mounting plate, compl. with tape guide	1	
101	205 750	Tension spring	1	
102	205 716	Shift spring	1	
103	205 724	Shift belt	1	
104	222 243	Flywheel mass, compl.	1	
105	210 472	Machine screw AM 3 x 4	7	
106	205 821	Adjustment clamp	1	
107	205 491	Tape guide, compl.	2	
108	210 142	"C"-clip 1.2	1	
109	223 156	Washer	1	
110	214 359	Washer	1	
111	223 057	Compression spring	1	
112	205 738	Tape guide	2	
113	205 740	Spacer, below	2	
114	214 352	Driving wheel, compl.	1	
115	214 357	Adhesiv felt washer	1	
116	214 349	Drive bushing, compl.	1	
117	210 143	"C"-clip 1.5	8	
118	205 775	Shaft	1	
119	205 356	Tape head flap, compl.	1	
120	210 143	"C"-clip 1.5	8	
121	223 185	Pressure lever, compl.	1	
122	206 047	Tension spring	1	
123	210 145	"C"-clip 2.3	9	
124	210 591	Washer 3.2 / 8 / 0.2 Hp	6	
125	214 369	Intermediate wheel, compl.	1	
126	210 591	Washer 3.2 / 8 / 0.2 Hp	2	
127	210 146	"C"-clip 3.2	4	
128	214 365	Intermediate wheel lever, compl.	1	
129	220 297	Front dress-up cover, compl.	1	
130	214 406	Side wall, right	1	
131	209 940	Rubber bushing	2	
132	214 319	Securing ring	2	
133	220 280	Tension spring	2	
134	218 019	Brake lever, right, compl.	1	
135	214 313	Shaft, compl.	2	
136	210 657	Washer 5.1 / 10 / 0.5 St	3	
137	210 369	Hex nut M 5	2	
138	210 194	Retainer ring G 2 x 0.6	6	
139	205 643	Roller shaft	1	
140	205 503	Pressure roller, compl.	1	
141	205 771	Centering screw	1	
142	214 332	Pressure lever, compl. with pressure roller	1	
143	210 144	"C"-clip 1.9	3	
144	202 277	Philips screw with crosshead AM 2.6 x 5	2	
145	217 554	Ring	2	
146	217 555	Compression spring	2	
147	217 553	Clamping sleeve	2	
148	214 297	Friction ring	2	
149	222 249	Take-up spindle, compl.	2	
150	210 591	Washer 3.2 / 8 / 0.2 Hp	6	

Pos.No.	Part No.	Description	Quantity	
151	214 263	Bearing, compl.	2	
152	210 591	Washer 3.2 / 8 / 0.2 Hp	6	
153	210 145	"C"-clip 2.3	9	
154	210 717	Washer 10.1 / 16 / 1 St	2	
155	210 371	Hex nut M 10 x 1	2	
156	205 484	Brake cord, compl.	2	
157	210 548	Washer 2.1 / 5.0 / 0.3 Hp	2	
158	223 056	Compression spring	1	
159	205 773	Cover	1	
160	205 659	Tension spring	1	
161	205 774	Disengage bracket	1	
162	210 361	Hex nut M 3	4	
163	210 486	Machine screw AM 3 x 8	2	
164	214 490	Counter, compl.	1	
165	217 604	Push button, compl. with clamp	6	
166	214 284	Damping piece	2	
167	202 243	Sheet-metal machine screw Z 3.5 x 6.5	30	
168	214 282	Push-button plate, compl.	1	
169	214 276	Rapid motion plunger, compl.	2	
170	214 276	Rapid motion plunger, compl.	2	
171	205 658	Tension spring	5	
172	214 275	Stop latch	1	
173	210 143	"C"-clip 1.5	8	
174	210 475	Machine screw AM 3 x 5	7	
175	205 640	Roller	2	
176	214 272	Push-button bracket, compl.	1	
177	214 274	Shaft	2	
178	210 143	"C"-clip 1.5	8	
179	204 777	Spacer nut	2	
180	220 604	Power supply with generator	1	
181	210 480	Machine screw AM 3 x 6	9	
182	205 666	Push-button slide	1	
183	200 601	Power cable, compl. (USA/Canada)	1	
184	220 712	Fuse, 400 mA quick-blow	2	
185	220 141	Power cable, compl.	1	
186	206 145	Audio cable, 5-poles, compl.	1	
187	210 151	"C"-clip 7	2	
188	214 343	Angled brake lever	1	
189	214 344	Tension spring	1	
190	205 874	Spacer ring	2	
191	220 380	Rocker switch	1	
192	210 361	Hex nut M 3	1	
193	210 382	Sunk screw AM 2.6 x 6.5	2	
194	216 038	Coaxial socket, 3 poles	1	
195	220 211	Mounting plate	1	
196	214 280	Stop plunger	1	
197	210 485	Machine screw AM 3 x 7	3	
198	214 281	Start plunger	1	
199	214 287	Tilt lever, compl.	1	
200	205 656	Torsion spring	1	
201	210 147	"C"-clip 4	2	
202	210 148	"C"-clip 5	4	
203	210 144	"C"-clip 1,9	3	
204	205 467	Rocker lever, compl.	1	
205	205 663	Roller	1	
206	205 665	Shaft	1	
207	220 712	Fuse, 400 mA quick-blow	2	
208	214 342	Pull rod	1	
209	216 314	C 10 — Paper capacitor 50 nF / 250 V ~ / 20 %	1	
	209 505	C 10 — Capacitor 10 nF / 250 V / (U.S.A.)	1	
210	214 508	Voltage selector	1	
211	220 620	Fuse holder, compl. with cover	1	
212	210 100	Power cable feed-trough	1	
213	214 391	Bottom	1	
214	214 260	Front rail	1	
215	214 262	Grommet	1	
216	214 251	Base plate, compl.	1	
217	204 959	Push type power switch	1	
218	205 668	Hairpin spring	1	
219	210 146	"C"-clip 3.2	4	
220	220 279	Pull rod	1	
221	210 146	"C"-clip 3.2	4	
222	214 345	Lever, compl.	1	
223	205 783	Tension spring	1	
224	205 676	Guide block	2	

Pos.No.	Part.No.	Description	Quantity	
	214 522	RCA type socket, compl.	4	
297	220 617	Printed circuit board, compl. for back wall Europe	1	
	220 549	Printed circuit board, compl. for back wall U.S.A./Canada	1	
298	214 515	Frame for VU-meter	1	
299	217 569	VU-meter, compl.	1	
300	214 518	Lighting lever	1	
301	214 519	Tension spring	1	
302	205 824	Stop rod	1	
303	214 340	Threaded support post	2	
304	205 827	Bearing clamp	1	
305	205 825	Compression spring	1	
306	210 384	Sunk screw AM 2.6 x 8	1	
307	214 595	Cord roller pair, 50 Hz, compl.	1	
	214 596	Cord roller pair, 60 Hz, compl.	1	
308	214 387	Felt washer	1	
309	211 683	Washer 4.2 / 8 / 0.2 St	1	
310	217 623	Washer 6.2 / 16 / 0.13 TFE	1	
311	222 248	Friction wheel, compl.	1	
312	220 282	Compression spring	1	
313	210 222	Threaded pin G 2.6 x 5	1	
314	214 381	Drive pulley, not compl.	1	
315	219 878	Bearing post	2	
316	222 252	Rotor, compl.	1	
317	222 251	Stator, compl.	1	
318	210 653	Washer 4.6 / 0.0 / 0.3 St	3	
	222 328	Washer 4.6 / 9.0 / 0.8 Ms	3	
319	219 882	Spacer short (6.5)	2	
	219 879	Spacer long (6.8)	2	
320	214 374	Lower motor support bracket, compl.	1	
321	210 367	Hex nut M 4	3	
322	209 461	5-pole socket	1	
323	222 247	Drive pulley, compl. 50 Hz	1	
	222 253	Drive pulley, compl. 60 Hz	1	
324	219 881	Hexagon bolt	2	
325	219 872	Upper motor support bracket, compl.	1	
326	219 070	Connection cord	1	
327	210 653	Washer 4.6 / 9 / 0.3 St	3	
	222 328	Washer 4.6 / 9 / 0.8 Ms	3	
328	205 613	Cable clamp	1	
329	210 157	Toothed washer A 4.3	2	
330	210 367	Hex nut M 4	3	
331	220 409	Insulation sleeve	1	
	217 927	Empty tape reel	1	
	220 514	Operating instructions (4 languages)	1	
	222 244	Packing carton, compl. (CTG 29)		
	222 245	Packing carton, compl. (TG 29 CV)		
	203 160	Aluminium front strip for wood base CK 10		
	216 603	Wood base CK 10, walnut veneer, compl. packed up		
	216 605	Wood base CK 10, white enamel, compl. packed up		
R 9	223 037	Layer resistor 680 Ohm / 0.5 W / 5 %	1	
R 115	220 547	Layer resistor 8.2 kOhm / 0.25 W / 5 %	4	
R 151	216 431	Layer resistor 180 kOhm / 0.25 W / 10 %	2	
R 215	220 547	Layer resistor 8.2 kOhm / 0.25 W / 5 %	4	
R 251	216 431	Layer resistor 180 kOhm / 0.25 W / 10 %	2	
C 9	222 498	Foil capacitor 33 nF / 250 V / 5 %	1	
C 131	220 968	Styroflex capacitor 3.3 nF / 100 V / 10 %	2	
C 231	220 968	Styroflex capacitor 3.3 nF / 100 V / 10 %	2	
180	220 604	**Power supply, compl. with generator**	1	
	204 777	Spacer nut	2	
	210 361	Hex nut M 3	1	
	210 480	Machine screw AM 3 x 6	2	
	210 486	Machine screw AM 3 x 8	1	
	211 635	Fuse clamp	2	
	220 712	Fuse, 400 mA, quick-blow	1	
L 1	220 291	Generator coil	1	
T 1	221 948	Transistor BC 172 C U CED = 30 V	1	
T 2	221 949	Transistor BC 252 C	1	
T 3	220 608	Transistor BD 135	1	

Pos.No.	Part No.	Description	Quantity	
D 1	220 606	Silicon diode BY 183/100	4	
D 2	220 606	Silicon diode BY 183/100	4	
D 3	220 606	Silicon diode BY 183/100	4	
D 4	220 606	Silicon diode BY 183/100	4	
D 5	220 607	Zener diode ZF 27	1	
R 2	211 244	Layer resistor 100 kOhm / 0.25 W / 10 %	6	
R 3	211 179	Layer resistor 2.2 kOhm / 0.25 W / 10 %	4	
R 4	211 179	Layer resistor 2.2 kOhm / 0.25 W / 10 %	4	
R 5	211 244	Layer resistor 100 kOhm / 0.25 W / 10 %	6	
R 8	220 616	Layer resistor 22 Ohm / 0.25 W / 10 %	1	
R 10	216 695	Layer resistor 120 Ohm / 0.25 W / 10 %	1	
R 11	216 353	Layer resistor 1 kOhm / 0.25 W / 10 %	1	
R 12	216 328	Layer resistor 470 Ohm / 0.25 W / 10 %	1	
R 13	216 701	Layer resistor 10 Ohm / 0.25 W / 10 %	1	
C 4	220 612	Electrolytic capacitor 47 µF / 35 V	1	
C 5	220 533	Ceramic capacitor, disc-type 10 nF / 250 V	2	
C 6	220 533	Ceramic capacitor, disc-type 10 nF / 250 V	2	
C 7	220 615	Foil capacitor 0.47 µF / 250 V / 20 %	1	
C 8	223 038	Styroflex capacitor 470 pF / 630 V / 5 %	1	
C 11	220 610	Electrolytic capacitor 220 µF / 50 V	1	
C 12	216 411	Electrolytic capacitor 100 µF / 35 V	1	
C 13	220 611	Electrolytic capacitor 470 µF / 35 V	1	
C 14	223 039	Foil capacitor 22 nF / 250 V / 5 %	1	
C 117	221 274	Trimmer capacitor 10/60 pF	2	
C 217	221 274	Trimmer capacitor 10/60 pF	2	
239	220 575	**Input amplifier, compl.**	1	
T 101	209 863	Transistor BC 173 C	4	
T 102	209 862	Transistor BC 172 C	12	
T 201	209 863	Transistor BC 173 C	4	
T 202	209 862	Transistor BC 172 C	12	
R 114/214	220 403	Tandem potentiometer 2 x 10 kOhm logarithmic	1	
R 1	220 601	Layer resistor 1.8 kOhm / 0.25 W / 10 %	3	
R 103	220 578	Layer resistor 3.9 kOhm / 0.25 W / 10 % low-noise	2	
R 104	216 703	Layer resistor 220 Ohm / 0.25 W / 10 %	6	
R 105	220 579	Layer resistor 120 kOhm / 0.25 W / 10 % low-noise	2	
R 106	220 546	Layer resistor 5.6 kOhm / 0.25 W / 5 % low-noise	2	
R 107	220 253	Layer resistor 56 kOhm / 0.25 W / 10 %	2	
R 108	220 581	Layer resistor 100 kOhm / 0.25 W / 10 % low-noise	2	
R 109	216 697	Layer resistor 3.3 kOhm / 0.25 W / 10 %	2	
R 110	216 700	Layer resistor 680 Ohm / 0.25 W / 10 %	2	
R 111	220 582	Layer resistor 68 Ohm / 0.25 W / 5 %	2	
R 112	216 429	Layer resistor 4.7 kOhm / 0.25 W / 5 %	2	
R 113	220 547	Layer resistor 8.2 kOhm / 0.25 W / 5 %	4	
R 203	220 578	Layer resistor 3.9 kOhm / 0.25 W / 10 %	2	
R 204	216 703	Layer resistor 220 Ohm / 0.25 W / 10 %	6	
R 205	220 579	Layer resistor 120 kOhm / 0.25 W / 10 % low-noise	2	
R 206	220 546	Layer resistor 5.6 kOhm / 0.25 W / 5 % low-noise	2	
R 207	220 253	Layer resistor 56 kOhm / 0.25 W / 10 %	2	
R 208	220 581	Layer resistor 100 kOhm / 0.25 W / 10 % low-noise	2	
R 209	216 697	Layer resistor 3.3 kOhm / 0.25 W / 10 %	2	
R 210	216 700	Layer resistor 680 Ohm / 0.25 W / 10 %	2	
R 211	220 582	Layer resistor 68 Ohm / 0.25 W / 5 %	2	
R 212	216 429	Layer resistor 4.7 kOhm / 0.25 W / 5 %	2	
R 213	220 547	Layer resistor 8.2 kOhm / 0.25 W / 5 %	4	
C 3	220 766	Electrolytic capacitor 47 µF / 25 V	3	
C 102	220 767	Tantalium electrolytic capacitor 22 µF / 6 V	6	
C 103	220 577	Ceramic capacitor, disc-type 1 nF / 500 V / 20 %	2	
C 104	220 765	Electrolytic capacitor 220 µF / 3 V	8	
C 105	216 664	Tantalium electrolytic capacitor 1 µF / 35 V	10	
C 106	220 765	Electrolytic capacitor 220 µF / 3 V	8	
C 202	220 767	Tantalium electrolytic capacitor 22 µF / 6 V	6	
C 203	220 577	Ceramic capacitor, disc-type 1 nF / 500 V / 20 %	2	
C 204	220 765	Electrolyt capacitor 220 µF / 3 V	8	
C 205	216 664	Tantalium electrolytic apacitor 1 µF / 35 V	10	
C 206	220 765	Electrolytic capacitor 220 µF / 3 V	8	
297	220 617	**Printed circuit board for back wall Europe**	1	
	220 549	**Printed circuit board for back wall U.S.A./Canada**	1	
R 101	216 415	Layer resistor 1 MOhm / 0.25 W / 10 %	2	

Pos.No.	Part No.	Description	Quantity	
R 102	216 416	Layer resistor 18 kOhm / 0.25 W / 10 %	5	
R 201	216 415	Layer resistor 1 MOhm / 0.25 W / 10 %	2	
R 202	216 416	Layer resistor 18 kOhm / 0.25 W / 10 %	5	
C 1	221 265	Ceramic capacitor, disc-type 0.1 μF / 12 V	1	
C 2	221 265	Ceramic capacitor, disc-type 0.1 μF / 12 V	1	
C 101	216 417	Ceramic capacitor, disc-type 180 pF / 100 V / 10 %	2	
C 201	216 417	Ceramic capacitor, disc-type 180 pF / 100 V / 10 %	2	
293	220 583	**Amplifier board, compl. equiped**	1	
	220 381	Output switch	1	
	220 382	Main switch	1	
	204 956	Tape speed switch	1	
	221 153	Shielding can	1	
L 102	220 312	Coil	2	
L 202	220 312	Coil	2	
T 103	209 862	Transistor BC 172 C	12	
T 104	209 862	Transistor BC 172 C	12	
T 105	209 863	Transistor BC 173 C	4	
T 106	209 862	Transistor BC 172 C	12	
T 107	209 862	Transistor BC 172 C	12	
T 108	209 862	Transistor BC 172 C	12	
T 203	209 862	Transistor BC 172 C	12	
T 204	209 862	Transistor BC 172 C	12	
T 205	209 863	Transistor BC 173 C	4	
T 206	209 862	Transistor BC 172 C	12	
T 207	209 862	Transistor BC 172 C	12	
T 208	209 862	Transistor BC 172 C	12	
D 101	213 297	Germanium diode SFD 037	4	
D 102	213 297	Germanium diode SFD 037	4	
D 201	213 297	Germanium diode SFD 037	4	
D 202	213 297	Germanium diode SFD 037	4	
R 116	216 686	Layer resistor 82 kOhm / 0.25 W / 10 %	4	
R 117	220 598	Layer resistor 330 Ohm / 0.25 W / 5 %	4	
R 118	220 543	Layer resistor 12 kOhm / 0.25 W / 5 %	2	
R 119	211 244	Layer resistor 100 kOhm / 0.25 W / 10 %	6	
R 120	220 602	Layer resistor 27 kOhm / 0.25 W / 5 %	3	
R 121	211 244	Layer resistor 100 kOhm / 0.25 W / 10 %	6	
R 122	217 842	Layer resistor 150 Ohm / 0.25 W / 10 %	4	
R 123	216 696	Layer resistor 2.7 kOhm / 0.25 W / 10 %	6	
R 124	220 603	Trimmer resistor 25 kOhm linear	3	
R 125	216 416	Layer resistor 18 kOhm / 0.25 W / 10 %	5	
R 126	220 603	Trimmer resistor 25 kOhm linear	3	
R 127	216 703	Layer resistor 220 Ohm / 0.25 W / 10 %	6	
R 128	313 189	Trimmer resistor 5 kOhm linear	1	
R 129	220 600	Layer resistor 1 kOhm / 0.25 W / 10 % low-noise	1	
R 130	216 643	Layer resistor 82 kOhm / 0.25 W / 10 %	2	
R 131	216 356	Layer resistor 120 kOhm / 0.25 W / 10 %	4	
R 132	216 838	Layer resistor 1.5 kOhm / 0.25 W / 5 %	2	
R 133	211 251	Layer resistor 150 kOhm / 0.25 W / 10 %	2	
R 134	216 696	Layer resistor 2.7 kOhm / 0.25 W / 10 %	6	
R 135	216 703	Layer resistor 220 Ohm / 0.25 W / 10 %	6	
R 136	220 548	Layer resistor 1 kOhm / 0.25 W / 5 %	4	
R 137	220 548	Layer resistor 1 kOhm / 0.25 W / 5 %	4	
R 138	220 601	Layer resistor 1.8 kOhm / 0.25 W / 10 %	3	
R 139	216 347	Layer resistor 33 kOhm / 0.25 W / 10 %	2	
R 140	216 381	Layer resistor 220 kOhm / 0.25 W / 10 %	2	
R 141	211 179	Layer resistor 2.2 kOhm / 0.25 W / 10 %	4	
R 142	216 686	Layer resistor 82 kOhm / 0.25 W / 10 %	4	
R 143	220 598	Layer resistor 330 Ohm / 0.25 W / 5 %	4	
R 144	211 202	Layer resistor 10 kOhm / 0.25 W / 5 %	2	
R 145	216 356	Layer resistor 120 kOhm / 0.25 W / 10 %	4	
R 146	216 696	Kayer resistor 2.7 kOhm / 0.25 W / 10 %	6	
R 147	217 842	Layer resistor 150 Ohm / 0.25 W / 10 %	4	
R 148	220 254	Layer resistor 10 kOhm / 0.25 W / 10 %	2	
R 149	216 416	Layer resistor 18 kOhm / 0.25 W / 10 %	5	
R 150	217 860	Layer resistor 1.2 kOhm / 0.25 W / 10 %	2	
R 216	216 686	Layer resistor 82 kOhm / 0.25 W / 10 %	4	
R 217	220 598	Layer resistor 330 Ohm / 0.25 W / 5 %	4	
R 218	220 543	Layer resistor 12 kOhm / 0.25 W / 5 %	2	
R 219	211 244	Layer resistor 100 kOhm / 0.25 W / 10 %	6	

Pos.No.	Part No.	Description	Quantity	
R 220	220 602	Layer resistor 27 kOhm / 0.25 W / 5 %	3	
R 221	211 244	Layer resistor 100 kOhm / 0.25 W / 10 %	6	
R 222	217 842	Layer resistor 150 Ohm / 0.25 W / 10 %	4	
R 223	216 696	Layer resistor 2.7 kOhm / 0.25 W / 10 %	6	
R 225	220 602	Layer resistor 27 kOhm / 0.25 W / 10 %	3	
R 226	220 603	Trimmer resistor 25 kOhm linear	3	
R 227	216 703	Layer resistor 220 Ohm / 0.25 W / 10 %	6	
R 229	220 599	Layer resistor 680 Ohm / 0.25 W / 10 % low-noise	1	
R 230	216 643	Layer resistor 82 kOhm / 0.25 W / 10 % low-noise	2	
R 231	216 356	Layer resistor 120 kOhm / 0.25 W / 10 %	4	
R 232	216 838	Layer resistor 1.5 kOhm / 0.25 W / 5 %	2	
R 233	211 251	Layer resistor 150 kOhm / 0.25 W / 10 %	2	
R 234	216 696	Layer resistor 2.7 kOhm / 0.25 W / 10 %	6	
R 235	216 703	Layer resistor 220 Ohm / 0.25 W / 10 %	6	
R 236	220 548	Layer resistor 1 kOhm / 0.25 W / 5 %	4	
R 237	220 548	Layer resistor 1 kOhm / 0.25 W / 5 %	4	
R 238	220 601	Layer resistor 1.8 kOhm / 0.25 W / 10 %	3	
R 239	216 347	Layer resistor 33 kOhm / 0.25 W / 10 %	2	
R 240	216 381	Layer resistor 220 kOhm / 0.25 W / 10 %	2	
R 241	211 179	Layer resistor 2.2 kOhm / 0.25 W / 10 %	4	
R 242	216 686	Layer resistor 82 kOhm / 0.25 W / 10 %	4	
R 243	220 598	Layer resistor 330 Ohm / 0.25 W / 5 %	4	
R 244	211 202	Layer resistor 10 kOhm / 0.25 W / 5 %	2	
R 245	216 356	Layer resistor 120 kOhm / 0.25 W / 10 %	4	
R 246	216 696	Layer resistor 2.7 kOhm / 0.25 W / 10 %	6	
R 247	217 842	Layer resistor 150 Ohm / 0.25 W / 10 %	4	
R 248	220 254	Layer resistor 10 kOhm / 0.25 W / 10 %	2	
R 249	216 416	Layer resistor 18 kOhm / 0.25 W / 10 %	5	
R 250	217 860	Layer resistor 1.2 kOhm / 0.25 W / 10 %	2	
C 107	220 767	Tantalium electrolytic capacitor 22 µF / 6 V	6	
C 108	218 434	Foil capacitor 22 nF / 400 V / 10 %	4	
C 109	220 594	Styroflex capacitor 1.5 nF / 160 V / 5 %	4	
C 110	220 594	Styroflex capacitor 1.5 nF / 160 V / 5 %	4	
C 111	220 595	Styroflex capacitor 68 pF / 160 V / 10 %	2	
C 112	220 597	Foil capacitor 0.1 µF / 160 V / 10 %	2	
C 113	216 664	Tantalium electrolytic capacitor 1 µF / 35 V	10	
C 114	216 664	Tantalium electrolytic capacitor 1 µF / 35 V	10	
C 115	220 765	Electrolytic capacitor 220 µF / 3 V	8	
C 116	216 673	Foil capacitor 3.3 nF / 400 V / 20 %	2	
C 118	220 592	Styroflex capacitor 330 pF/ 160 V/ 5 %	2	
C 119	220 767	Tantalium electrolytic capacitor 22 µF / 6 V	6	
C 120	216 667	Ceramic capacitor, disc-type 100 pF / 100 V / 10 %	2	
C 121	218 434	Foil capacitor 22 nF / 400 V / 10 %	4	
C 122	220 596	Foil capacitor 10 nF / 400 V / 10 %	2	
C 123	220 593	Styroflex capacitor 680 pF / 160 V / 5 %	2	
C 124	220 766	Electrolytic capacitor 47 µF / 25 V	3	
C 125	216 664	Tantalium alectrolytic capacitor 1 µF / 35 V	10	
C 126	217 863	Foil capacitor 6.8 nF / 400 V / 10 %	2	
C 127	216 664	Tantalium electrolytic capacitor 1 µF / 35 V	10	
C 128	220 591	Ceramic capacitor, disc-type 220 pF / 500 V / 20 %	2	
C 129	220 550	Electrolytic capacitor 4.7 µF / 25 V	2	
C 130	220 765	Electrolytic capacitor 220 µF / 3 V	8	
C 207	220 767	Tantalium electrolytic capacitor 22 µF / 6 V	6	
C 208	218 434	Foil capacitor 22 nF / 400 V / 10 %	4	
C 209	220 594	Styroflex capacitor 1.5 nF / 160 V / 5 %	4	
C 210	220 594	Styroflex capacitor 1.5 nF / 160 V / 5 %	4	
C 211	220 595	Styroflex capacitor 68 pF / 160 V / 10 %	2	
C 212	220 597	Foil capacitor 0.1 µF / 160 V / 10 %	2	
C 213	216 664	Tantalium electrolytic capacitor 1 µF / 35 V	10	
C 214	216 664	Tantalium electrolytic capacitor 1 µF / 35 V	10	
C 215	220 765	Electrolytic capacitor 220 µF / 3 V	8	
C 216	216 673	Foil capacitor 3.3 nF / 400 V / 20 %	2	
C 218	220 592	Styroflex capacitor 330 pF / 160 V / 5 %	2	
C 219	220 767	Tantalium electrolytic capacitor 22 µF / 6 V	6	
C 220	216 667	Ceramic capacitor, disc-type 100 pF / 100 V / 10 %	2	
C 221	218 434	Foil capacitor 22 nF / 400 V / 10 %	4	
C 222	220 596	Foil capacitor 10 nF / 400 V / 10 %	2	
C 223	220 593	Styroflex capacitor 680 pF / 160 V / 5 %	2	
C 224	220 766	Electrolytic capacitor 47 µF / 25 V	3	
C 225	216 664	Tantalium electrolytic capacitor 1 µF / 35 V	10	
C 226	217 863	Foil capacitor 6.8 nF / 400 V / 10 %	2	
C 227	216 664	Tantalium electrolytic capacitor 1 µF / 35 V	10	
C 228	220 591	Ceramic capacitor, disc-type 220 pF / 500 V / 20 %	2	
C 229	220 550	Electrolytic capacitor 4.7 µF / 25 V	2	
C 230	220 765	Electrolytic capacitor 220 µF / 3 V	8	

Alterations reserved.

Dual

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